NIGERIA

IMPERIAL MYCOLOGICAL INSTITUTE
7 SEP 1946

Annual Report
on the
Agricultural Department
for the year
1944

Laid on the Table of the Legislative Council as Sessional Paper No. 13 of 1946

Printed and published by the Government Printer, Lagos, 1946. To be purchased at the C.M.S. Bookshops, Lagos and Port Harcourt; the S.I.M. Bookshop, Jos; and the Crown Agents for the Colonies, 4 Millbank, London, S.W.1. Price 2s

GP Lagos 1348/646/600

TABLE OF CONTENTS

	Paragraphs
INTRODUCTION	
THE 1944 SEASON	1
LOCUSTS	2
ANIMAL HUSBANDRY	3
SHIKA STOCK FARM	7
Health of Stock	13
Routine inoculations	16
ILORIN STOCK FARM	19
Routine inoculation	21
The West African Shorthorn Herd	22
The Ndama Herd	23
The Graded Herd	25
Transfers from Ilorin	26
DAIRIES	
Yaba	27
Ibadan	29
Dairy Products — Northern Provinces	30
Cattle Control — Kabba and Ondo	31
POULTRY	32
PIGS	33
GOATS	34
AGEGE CATTLE FATTENING SCHEME	35
FODDERS AND PASTURES	36
SOIL CONSERVATION	
Northern Provinces	37
Eastern Provinces	39
Western Provinces	40
CHEMISTRY SECTION	
Eastern Provinces	41
Oil Palm Research Station ...	42
Soil Deficiency at Moor Plantation	44
IRRIGATION	46
EDUCATION	
School of Agriculture, Ibadan	47
School of Agriculture, Samaru	48
Farm School, Oyo	49
Imperial College of Tropical Agriculture, Trinidad ...	50
SETTLEMENT SCHEMES	51
OIL PALMS	52
Palm Oil Machinery	53
Oil Palm Research Station ...	54
Chemical Notes on Palm Oil ...	55
Palm Kernel Borer	58
COCOA	
Botanical Work	59
Cocoa Survey	62
HEVEA RUBBER	63
KOLA	64
COFFEE	65
FRUIT	
Citrus	66
Mangoes	68
RICE	69
COTTON	
Northern Provinces	72
Southern Provinces	73
Pink Bollworm	74
GROUNDNUTS	75
BENNISEED	78
POTATOES	79
GUINEA CORN	81
CHILLIES	82
SOYA BEANS	83
GINGER	84
CINCHONA AT ESOSONG	85
DATES	86
VEGETABLES	87
SUGAR	88
ROPE AND TWINE	89
PRODUCE INSPECTION	90
BAMENDA FARM	98
MARKETING	99
CONTROL OF "KASHIN YAWO"	100

INTRODUCTION

The general programme of the Department although subjected to minor modification, has continued for the most part unchanged. The Supply Section of the Department was abolished during the year and its duties were taken over by the Director of Supplies in the Secretariat at Lagos. The Fisheries Officer was transferred to the Development Branch of the Secretariat and the Military Authorities relieved the Department of the responsibility for Army Cattle supplies. Shortage of staff continued to limit activities. Three Production Officers, whose appointment had been approved, had not arrived by the middle of 1945, and in consequence it became necessary to curtail some of our other activities in order to proceed with such special work as the Cocoa Survey and the production of Cinchona, details of which will be dealt with more fully in the body of this report.

Most of the energy of the department was concentrated on the war effort in general and the production of essential foodstuffs in particular. Details of this latter activity have been given in my Half-Yearly Production Reports, which should be regarded as supplementary to this. It has not been possible to tackle many long-term research problems and these must of necessity await increases in suitably qualified staff.

Captain J. R. Mackie, C.M.G., who was appointed Director of Agriculture in Nigeria in 1936 proceeded on leave in February, 1945, prior to retirement which will take place after twenty-four years in the Nigerian Service.

Dr George Bryce, O.B.E., Assistant Director of Agriculture left Nigeria during 1944 after fifteen years of service in the country.

Both these officers have given distinguished service to Nigeria, and in particular during the late war. Captain Mackie was co-author with Mr O. T. Faulkner, C.M.G., former Director of Agriculture, of a useful text book entitled " West African Agriculture."

Annual Report on the Agricultural Department, Nigeria, 1944

THE 1944 SEASON

1. Dry conditions including severe Harmattan continued later than usual into the early months of the year. This was particularly marked in the Middle belt and parts of the South where in some districts the earliest planted crops made a poor start. In other areas planting was delayed for a month or six weeks beyond the normal time on account of absence of rain. Locusts were responsible for damage to crops, mainly in the extreme north, in April - May but their effect proved to be less severe than was at first expected. Heavy rains were experienced towards the latter part of the wet season but in most areas they stopped prematurely and were followed by another abnormally severe dry season. Some places in the Northern Provinces registered the lowest annual precipitation on record. In the Southern Provinces the total for the year was little below average but for ideal cropping conditions the rainfall was too concentrated and finished too abruptly.

Typical records for the year are shown below.

RAINFALL 1944 (IN INCHES)

	Abeokuta	*Ilorin*	*Benin*	*Umuahia*	*Zaria*	*Kafinsoli*
January ..	1.30	0.00	0.24	0.25	0.00	0.00
February ..	1.07	0.38	0.27	4.35	0.00	0.00
March ..	3.40	3.53	5.79	8.21	0.94	0.00
April ..	4.97	4.36	4.25	4.71	0.10	0.32
May ..	6.41	4.87	5.75	8.75	1.71	3.84
June ..	7.06	7.03	13.30	9.49	5.46	5.15
July ..	5.29	5.70	10.66	10.47	5.69	12.67
August ..	3.56	5.03	7.70	12.18	15.30	5.46
September	4.86	10.55	14.20	18.00	5.25	0.51
October ..	5.84	13.99	9.35	8.73	0.41	0.00
November	1.34	1.37	1.11	3.46	0.00	0.00
December	0.28	0.00	0.00	2.28	0.00	0.00
Total ..	45.38	56.81	72.62	90.88	34.86	27.95
Average for past years	47.60 (45 years)	50.5 (40 years)	81.02 (22 years)	91.60 (21 years)	41.11 (10 years)	32.86 (10 years)

LOCUSTS

2. Between March the 11th and the 26th June 354 swarms of Desert Locust were reported from the Northern Provinces; they passed northward and eastward out of Nigeria without breeding. Only seven swarms of desert locusts and none of other species were reported during the rest of the year.

A scouting service was maintained throughout the season and a mobile unit with poison bait and impedimenta was based on Kano. There was however, no occasion for using this. The six scouts were posted after training to selected areas bordering on Lake Chad where they worked under the Control of the Agricultural Officer, Bornu Province. Reports on the appearance of locusts and hoppers were submitted with specimens to the Senior Entomologist, Ibadan by Administrative Officers.

Mixed Farming

3. The Department's livestock programme or policy was outlined in my Annual Report for 1943. In this there has been no fundamental change; progress has been made in several directions.

The extension of mixed farming in the Northern Provinces goes forward slowly but progressively, as shown by the following figures:—

Date	*Number of Mixed Farmers*
30.9.40	1,820
30.9.41	2,031
30.9.42	1,962
30.9.43	2,125
30.9.44	2,247

The intrinsic soundness of mixed-farming has always been apparent, but the advantage of its application to congested semi-urban areas is becoming increasingly apparent. If the growing city populations are to be fed the increase in production must be of high quality, and shifting cultivation must give way to improved methods for maintaining and increasing fertility. But in this respect it is possible that the loss of vital minerals through the export of primary crops can be replaced best by using imported or locally produced artificial manures. Investigation of these has already been done on a small scale but this will be a major line of long-term research when adequate staff becomes available.

4. The greatest obstacle to the expansion of mixed farming is animal disease. The following figures for cattle under departmental control show the losses during the period October 1943 - September 1944.

Total head of stock:	
Government Farms	9,511
Mixed Farmers	5,468
Pools	2,611
	17,590
Total Losses (= 18.90 per cent)	3,337
Losses were attributed to :	
	Percentage
Disease	67.09*
Causes other than disease (including unsuitability and unauthorised sales)	27.10
Unspecified	5.81
	100.00

* Losses from disease were estimated by Agricultural Officers as follows:—

	Percentage
Trypanosomiasis	30.12
Pleuropneumonia	6.83
Liver diseases	5.09
Rinderpest — natural	4.91
Rinderpest inoculation	6.74
Heartwater	8.39
Other diseases	5.01
	67.09

5. Experience has shown that in developing mixed farming better results are obtained in areas where there is a concentration of mixed-farmers than among scattered farmers. This is due not only to greater ease of supervision but also to possibilities for the fostering of a co-operative spirit. Results in certain areas, namely, Misau, in Bauchi Province; Northern Katsina; Daura and Kano Emirates, are better than in others, mainly because these areas are healthy for cattle and because more European supervision is available. In Sokoto progress is disappointing, for communications are not good and the lack of necessary supervision prevents any real expansion. At Riyom, in Plateau Province, a training centre is being opened to teach the local farmers how to look after cattle, and a start has been made by issuing to farmers, on easy repayment terms, young bulls which they should grow to maturity and sell at a profit while at the same time obtaining a supply of farm-yard manure. The farmers are taking an interest and prospects are promising. They are taught to house their cattle, feed them with acha hay and waste products of the farm and to manage them efficiently. In Katsina good progress is being made, the farmers being encouraged to buy bulls and grow them to full store age and then sell for an increased price. As many as 146 were sold by Northern Katsina farmers in 1944. Too many immature bulls are being trekked to the Southern Provinces with the consequent loss of beef to the country, and if farmers can be induced to buy these beasts and rear them to full maturity a considerable saving will occur. On grounds of economy of labour farmers are encouraged to practise communal herding and the greatest stress continues to be placed on the making of farm-yard manure and compost.

6. The experimental unit farms on the farm centres continue to give us valuable data regarding the economics of mixed farming. A promising cattle auction is being operated by the Veterinary and Agricultural Departments at Kano, and among the cattle sold are many fattened by mixed farmers. Croppng experiments on farm-yard manure and night soil have been carried out at Kano Farm where present indications are that while farm-yard manure is a superior fertiliser to night soil both are efficient. The Medical Department at Kano has done most progressive work on night soil and much valuable material which was previously wasted is now converted to farm use, the public being educated to the fact that no material suitable for fertilising the land should be wasted. Mixed farming with Zebu cattle in Bida Division is not very promising owing to the high incidence of trypanosomiasis, and even Borgawa cattle from tsetse areas of Ilorin cannot stand up to farm work there. A trial is now being made there with half-bred Ndama × Zebu cattle

bred at Ilorin stock farm. At Daura 321 mixed farmers are making promising progress. In Maiduguri the Department is still engaged in collecting basic economic facts and figures before sponsoring a programme of mixed-farming. Very good progress is being made in Bauchi, especially in Misau Emirate, and the increase would be more rapid here but for the high price and shortage of suitable cattle. A most successful cattle market supervised by the Department is being operated at Daudawa where about 400 beasts are bought and sold at a fortnightly market. Grades of younger beasts are bought by the settlers on Daudawa who after careful feeding and handling can resell at a profit when the animals reach maturity; in this way at least some undersized beasts which would normally find their way to the Southern Provinces markets are left in the Northern Provinces to reach full weight, and it is hoped to extend this principle to other centres.

SHIKA STOCK FARM

7. *General.*—1944 was again a season of poor rainfall and only 29.9 inches were recorded during the year compared with a fifteen year average of 48.48 inches. For the second season in succession the start of the wet season was four weeks overdue, and this was followed by an abrupt termination of the rains in October. The lack of early season grazing again seriously affected the milk yields of the two herds, and the position with regard to milk production was further aggravated by a major outbreak of trypanosomiasis among all classes of stock towards the end of the year. On the other hand it is satisfactory to report that the reduction in the incidence and virulence of calf scour reported at the close of the last season has been maintained, and there has been a reduction in the proportion of fatal cases.

In spite of difficulties experienced in cultivation owing to drought, crops were reasonably good, especially in the case of guinea-corn which averaged 1,357 lbs per acre over the 140 acres cultivated. The high manurial rates at Shika undoubtedly tend to retain soil moisture.

8. *Milk Yields 1944.*—The herd milk yields show a substantial fall for the second year in succession. After disappointing results in 1943 the lactation average of the White Fulani Herd has again fallen from 2,139 lbs to 2,108 lbs, and that of the Sokoto Herd from 2,186 lbs to 2,012 lbs. The " pounds per day between calves " index shows a similar drop from 6.09 lbs to 5.49 lbs in the case of the White Fulani and from 6.21 to 5.41 in the Sokoto Herd. For two seasons in succession the early season drought has denied the milking herd the usual fresh spring grazing in May, and this has affected yields during that period. Also the high mortality among calves through scour in 1943 caused a lowering of milk yields. For statistical purposes a cow only completes her lactation when she calves subsequent to it. Hence lactation figures for 1944 included those of many cows whose records had been impaired by these extraneous circumstances in 1943.

9. Following the precedent of last year's report where an attempt was made to assess the extent to which mature and immature lactations may have influenced the year's average, the following table has been brought up-to-date. It compares on a percentage basis the number of first and second (immature) lactations with (mature) fourth and subsequent lactations. In column V the index figure of pounds-per-day-between-calves has been corrected to " mature " lactations using the correction figures given in last year's report.

	Number of Lactations Analysed	Percentage of 1st and 2nd Lactations	Percentage of 4th and subsequent Lactations	P.D.B.C. INDEX	P.D.B.C. Corrected Index
	I	II	III	IV	V
White Fulani Herd					
[illegible]	74	50	17.6	5.49	6.69
1943	48	64.6	6.2	6.09	7.53
[illegible]	73	58.9	30.1	6.70	8.09
[illegible]	93	45.2	37.6	6.87	8.09
*1937	47	51	33.3	7.03	8.30
Sokoto Cattle Herd					
[illegible]	18	77.7	11.1	5.41	6.84
[illegible]	16	75	6.2	6.21	7.80
1942	28	39.3	42.8	6.37	7.61
1941	32	50	37.5	6.36	7.60
*1937	24	37.5	37.5	8.40	9.81

* Record year.

10. Compared on this basis the 1943 fall in yields is much more serious than in 1942. Although aided by the poor grazing conditions and by the outbreak of trypanosomiasis reported below, the falling off in herd averages is sufficiently serious to call for a detailed examination of all factors which may be involved. A preliminary investigation reveals a falling off in sweet potato tuber yields, over the past few years, a succulent supplement of prime importance to milking cows during the dry season. Again the effect of the substitution by palm kernel meal of a relatively high proportion of the farm's requirements of cotton seed, enforced through the Ministry of Supply's war needs, requires experimental investigation. The adverse effect of this improvisation on the general nutritional balance has probably been aggravated by overstocking which in turn was caused by a desire to anticipate and fulfil future requirements of female stock at Lagos and Moor Plantation Dairies.

11. The decline in yields, coupled with considerations outlined above, strongly suggests that a drastic culling of all inferior stock is overdue; this will receive attention immediately after the records of all Shika Stock have been closely scrutinized.

During the year the following outstanding lactations were recorded. It will be seen that White Fulani stock bull No. 19 sired six of these record cows.

White Fulani			Sokoto Herd		
Cow No.	Yield—lbs	Sire No.	Cow No.	Yield—lbs	Sire No.
318	3,905 in 292 days	19	144	3,120 in 279 days	13
303	3,683 in 373 ,,	19	142	3,026 in 405 ,,	9
208	3,581 in 335 ,,	12			
333	3,516 in 433 ,,	19			
401	3,459 in 304 ,,	24			
327	3,246 in 294 ,,	19			
263	3,133 in 332 ,,	14			
278	3,068 in 273 ,,	18			
317	3,084 in 318 ,,	19			
319	3,007 in 264 ,,	19			

12. The influence of the sire on this year's yields is summarized in the following table:—

White Fulani Herd

Place	*Sire*	*Strain*	*Number of Daughters*	*Average Yield Lbs Lactation*	*Average Lbs Per Day between Calves*
1	18	18	3	2777.7	8.56
2	19	19	15	2533.4	6.47
3	23	2	3	2353.3	6.50
4	13	2	10	2246.2	5.76
5	24	4	9	2072.8	5.39
6	4	4	6	2026.5	5.69
7	21	21	4	1992.2	5.61
8	17	17	6	1933.3	5.10
9	14	2	11	1780.6	4.17
10	25	17	1	1740	4.40
11	20	20	4	1473.2	3.92
12	22	2	1	1392	3.83
13	12	12	1	1362	4.07
Herd Average ..			74	2110.8	5.49

Gudali Herd

13	13	2	2579	6.24
9	9	2	2303	5.46
12	12	2	2138	5.94
7	7	1	2048	6.34
14	2	4	1808	5.58
15	7	3	1686	4.91
6	6	3	1675	4.36
Unknown		1	2797	6.99
Herd Average ..		18	2012	5.41

The most notable feature of the above table is the record of enhanced yields of 15 daughters of White Fulani Stock Bull No. 19. This has raised this bull from 7th place in 1943 to second in order of merit in 1944. Stock Bulls numbered 17 to 21 are the last five purchased bulls being tested and preliminary statistics suggest that Nos. 17, 20 and 21 are comparative failures, whilst both No. 18 and No. 19 will become welcome additions to our proven milk strains.

White Fulani Stock Bull No. 13, having proved his worth through a 1934 crop of daughters, sired a second crop of calves in 1939. To date none of these younger cows has shown the milking capacity of their elder sisters, which latter include two White Fulani 500 gallon cows, Nos. 200 and 203.

Health of Stock

13. *Calf Scour.*—The course of the 1942-43 epidemic of calf scour was discussed in my last report. Reference was also made to the significant reduction in incidence brought about by the fly-proofing of one set of calf buildings. During 1944 fly-proofing of the remaining individual calf pen sections was completed. From February the vaccination of calves with Vom vaccine No. 3 became routine, except that controls numbering approximately one in five, were left unvaccinated in order to assess the effectiveness of this prophylactic. No calves were vaccinated during

a period covering part of October and November, when the supply of the vaccine ran out. Results would appear to confirm the value of the Veterinary Pathologist's vaccine. Although the incidence of scour in the vaccinated calves at 34.3 per cent, was considerably higher than with the controls, the percentage of deaths from scour was 51.4 per cent higher in unvaccinated calves. The controls will be continued in 1945 as the Veterinary authorities will want confirmation of this result, especially in view of the lack of success experienced elsewhere in prophylactic vaccines against bacillary diarrhoea. The fall in total deaths has been maintained and there are encouraging indications that the epidemic stage has now passed.

14. *Alternative Milk Recording.*—Concurrently with the above control measures, two experiments were started with twelve selected cows to determine whether any alternative method of recording can be devised which will overcome the disadvantages inherent in bucket feeding, and at the same time provide a reliable record of milk capacity. One group of six cows are milked from two quarters of the udder only, the other two being left for the calves. The quarters milked are alternated each day. The second group are stripped one day in seven, and the weekly yield is calculated from a single day's milking. These trials will not be completed for a few months, but first indications promise favourably. It is noteworthy that only two out of the twelve sucking calves developed scour, roughly 16 per cent against the normal 30 per cent for bucket fed calves.

15. *Abortion.*—The abortion figure for the year is above average; it includes three purchased cows in poor condition and undergoing isolation. Not one Shika-bred cow that aborted proved positive to the Contagious Abortion Test.

Year	*Percentage*	*Year*	*Percentage*
1937	3.6	1941	3.2
1938	4.7	1942	3.3
1939	4.5	1943	8.9
1940	4.6	1944	6.6

Contagious Abortion.—An innovation in connection with contagious abortion is the vaccination of Shika heifer calves, between the ages of 5 and 18 months, with a live vaccine prepared from the American strain S19. Fifty-five heifer calves received prophylactic treatment. This action by the Veterinary Department is most welcome. The use of this live vaccine is expected to ensure that all calving heifers entering these herds from the end of 1945 will be immune.

During the year, 44 Shika cows were tested by the Veterinary Department for contagious abortion. They included all non-contagious aborting home-bred cows and 32 new purchases undergoing a twelve month isolation period. There were three reactors amongst the latter group which were transferred to Samaru to join the "positive" herd maintained in isolation at Bomo. There were no reactors among the home-bred stock.

Routine Inoculations

16. Immunization of young stock against rinderpest was carried out in November when a total of 240 calves were dealt with. Dried goat virus was again used. Mortality associated with this inoculation totalled sixteen, or 6.7 per cent, but it is suspected that the casualties included a number of calves suffering from trypanosomiasis. The corresponding figure for mortality after the inoculation of young animals in October, 1943, was 8.9 per cent.

Pleuropneumonia.—The new method of triple inoculation against pleuropneumonia was carried out in the case of all Shika stock. Reactions were slight and the only casualties were two animals slaughtered on account of badly atrophied tails.

Trypanosomiasis.—During the year twenty-two blood smears from animals suspected of trypanosomiasis were examined by the Veterinary Department. Of these only one case of *T. congolense*, and four of *T. vivax* were confirmed. Towards the end of the year, however, a large scale infection of all classes of stock was suspected and the outbreak was definitely confirmed in January. Two hundred unthrifty suspects have been segregated in two separate blocks of buildings, evacuated for the purpose, and are undergoing blood examination. The Sleeping Sickness Service kindly lent a microscopist who had by mid-March 1945 examined approximately 600 wet blood preparations in addition to several gland punctures. Between 15 per cent and 20 per cent of the suspects have proved positive, and smears from these animals are being sent to Vom for species identification. Meanwhile eighty head of stock are undergoing tartar emetic treatment, the course of injections being given by a Veterinary Madam detailed for that purpose. The Senior Veterinary Officer proposes to test experimentally the efficacy of several of the newer drugs reputed to be effective against *T. congolense*. At the time the disease manifested itself among the cattle Mr Evans, Propaganda Officer of the Sleeping Sickness Service, visited Shika and confirmed the presence of *Glossina tachinoides* in an adjacent river which was considered free from fly. He has recommended a much more rigorous clearing of both the Shika and Guga Rivers than has hitherto been undertaken. Special funds were allocated to implement these recommendations.

17. *Blood Meal Feeding Trial.*—The 1943 blood meal feeding experiment was repeated during the year and results, although not spectacular, were again satisfactory and are tabulated below.

Pen	*No. of Calves*	*Average Weight at Start Lbs*	*Average Weight at End Lbs*	*Average increase in Weight per day*
First Period : 4 Weeks				
1. Rations alone	8	283.75	308.88	0.89 lbs
2. Rations and 4 ozs Blood Meal	8	284.64	319.13	1.23 „
Second Period : 4 Weeks				
1. Rations and 4 ozs Blood Meal	8	308.88	367.88	2.11 „
2. Rations alone	8	319.13	368.00	1.75 „

While confirming the value of blood meal to unthrifty stock the results were not so marked as with the younger stock experimentally fed earlier in the same dry season. This is undoubtedly due to the superior grazing which was available between May and July, and is confirmed by the basic increase of 0.89 lbs per head per day compared to 0.38 lbs in last year's trial. Under these conditions this year the average daily weight increase specifically due to the feeding of 0.25 lbs blood meal was only 0.35 lbs compared with 0.42 lbs last year. The trial confirms the value of this concentrate to all classes of unthrifty stock.

18. *Castration Experiment.*—In my report for 1943 reference was made to the first phase of the 1937-45 Castration Experiment. The final result should prove of definite value to all connected with the meat industry; meanwhile the results of the first of a series of slaughter tests has brought to light the following points in

addition to the greater total dead weight of the castrated animals:—

(*a*) The entire has a larger hump.

(*b*) The entire has a heavier hide.

(*c*) The castrated ox has a higher percentage of suet and caul fat than the entire animal, the ratio being 4.36 per cent: 1.7 per cent.

(*d*) The castrated ox lays more meat on its hindquarters in comparison to its forequarters than does the bull. The percentage of hindquarters in the ox is 54 while in the bull it is 46.

(*e*) The relative weights of topside, sirloin and rump also favour the castrated ox.

ILORIN STOCK FARM

19. As explained in earlier reports the primary object of our work at Ilorin is to find and develop a type of cattle suitable for the Southern Provinces and "middle belt" where, on account of the prevalence of trypanosomiasis the Zebu cattle of the Northern Provinces cannot survive. The dwarf "Nigerian Shorthorn" is known to be tolerant of southern conditions but this breed is unsatisfactory on account of its small size and poor conformation. The Gold Coast Shorthorn breed was introduced nine years ago and more recently the Ndama, from French Guinea. Both of these breeds have shown considerable tolerance of Ilorin conditions, especially the Ndama which is in every respect the better animal. A tendency of the Ndama towards irregular breeding caused some concern initially but this has improved and further reduction in the interval between calves is anticipated. In addition to the two pure-bred herds (that is: Ndama and Gold Coast) a third herd comprising various types of local Nigerian cows is being graded to Ndama bulls, and this herd has been transferred to Ibadan.

There was an increase of stock on the farm from 220 at the beginning of the year to 246 at the end of the year, despite a net decrease by transfers of eleven animals, loss by death of twenty and by a net decrease of three on sales and purchases. Sixty calves of all classes were born on the Central Farm. There were four cases of abortion and three of still birth.

20. *Protozoic Infection.*—The number of animals showing trypanosomiasis as well as losses due to trypanosomiasis has continued to decrease but a greater number have shown piroplasma and anaplasma. The volume of infection by these last two parasites was heaviest in the month of November, but cases were numerous in all months of the year, with the exception of February and June. Infection was heaviest among young stock, and some animals have developed symptoms of infection as early as five days after their birth. The incidence of ticks was great, especially during the last quarter of the year, despite the fact that most of the pastures were burnt last dry season.

Losses from parasites have nevertheless not been heavy. Fifteen animals of various classes have been lost to parasitic disease (in comparison there were 15 in 1943 and 32 in 1942); of these seven were adults and eight young animals. Three of the adult losses were work bulls lost to trypanosomiasis.

The critical period for protozoic infection on the farm continues to be October - December. Prior to October 1944 losses from parasites were only two (one in January and the other in March) while there were five in October, four in November and four in December. The very low average weight gain for calves under 300 lbs liveweight for the month of October was at least partly due to the heavy protozoic infection during that month.

Routine Inoculation

21. *Rinderpest.*—After preliminary trials conducted by the Veterinary Officer, attenuated goat virus and serum followed six months later by virus alone, has been substituted for spleen vaccine for all our stock above 2½ years old. The use of spleen vaccine is continued in the case of younger animals. No losses occurred in either the experiments or general treatment but a number of work bulls reacted severely and were out of use for a considerable period.

Blackquarter and Pleuropneumonia.—The usual routine inoculations were given.

Feeding Experiments.—Towards the close of the year feeding trials with hay were started with stock of various ages with the object of finding its value as a supplement to and as a substitute for grazing during the dry season. The use of blood meal in livestock rations was also under trial.

The West African Shorthorn Herd

22. Animals of this breed increased in number from 67 at the beginning, to 81 at the end of the year. Eight animals were received on transfer and there were twenty-four live-births (twelve heifers and twelve bulls) and eight of these live-births were from heifer-calvings. There were also two still-births and one abortion. The average interval between calves for the sixteen cows calving during the year was 430 days. This high average figure was unduly weighted by abnormal breeding shyness in two old cows.

Losses during the year totalled eighteen (nine deaths, four sales and five transfers). The cause of loss and the number of losses attributed to each cause are shown below:—

Trypes.	Piropl.	Tryps and Piropl.	Tryps and Anapl.	Tryps., Piropl and Anapl.	Slaughtered	Transfers and Sales
2	1	2	1	2	1	9

Of the losses from protozoic diseases all were young stock except the two animals lost from tryps and the one lost from piroplasmosis. Two of the losses from other causes were of adult animals; one of these was slaughtered when she was unable to deliver her calf, while the other animal was sold on account of blindness.

Trypanosomiasis Resistance in the West African Shorthorn Herd.—The study of resistance to trypanosomiasis and the ability to transmit such resistance to progeny continued during the year, and the tables connected with this study were amended and brought up to date. With the inclusion of additional data these tables have become rather unwieldy and it is therefore not proposed to include them in this report. There has been nothing to change the opinion we formed during past years regarding trypanosomiasis resistance in this breed, namely, that resistance is at least partly an inherited characteristic and that the degree of inherited resistance varies between different strains.

The Ndama Herd

23. The Ndama animals have continued to maintain their high reputation for resistance to trypanosomiasis and for general performance and there seems no doubt that they are most suitable for our requirements.

This breed increased in numbers from 58 at the beginning of the year to 69 at the end of the year. There were eighteen live-births (9 bulls and 9 heifers) six of these live-births being from heifer-calvings and in addition there were one still-birth and two abortions. These figures do not include Gambia cows and Gambia

grades -- a type very similar to the Ndama -- which are run with the Ndama herd for the purpose of management.

Losses which numbered seven were as follows:—

(1) One old cow which died from trypanosomiasis.
(2) Two cows which died of scour and piroplasmosis respectively.
(3) A barren cow which was sold.
(4) Two animals sold for meat; one was undersized and the other was paralysed following an accident.
(5) Net loss of one on transfers to and from the herd.

The average number of days between calves for the twelve cows that calved during the year was 520 days (in comparison there were 433 for 1943 and 515 for 1942.) The high average for this year was caused by the inclusion of figures relating to six quite abnormal cows. The table below contains all available records for calving intervals since the Ndamas were bought in 1939.

Average Number of Days Between Calves for those Ndama Cows which have calved twice or more at Ilorin.

Calves at Ilorin	1st	2nd	3rd	4th	5th	*Average Number of days between calves*
Cow No.	*Days between Calves*	*Days between Calves*	*Days between Calves*	*Days between Calves*	*Days between Calves*	
IND 11	⋮	553	—	—	—	553
12	353	543	519	333	—	437
13	525	848	—	—	—	687
14	489	394	564	—	—	482
16	464	464	534	—	—	487
17	348	395	488	342	—	393
18	484	893	—	—	—	689
19	600	414 abortion 9 weeks early	366	356	312	409
20	580	435	597	—	—	537
21	665	658	370	—	—	564
22	541	570	335	403	—	462
23	504	401	504	—	—	470
24	⋮	570	566	466 abortion 10 weeks early	—	568
25	⋮	487	530	378	—	465
26	758 abortion 5 weeks early	—	—	—	—	—
27	513	485	409	531	—	485
28	529	479	—	—	—	504
32	533	—	—	—	—	533
IND 35	—	—	—	—	—	—
39	387	—	—	—	—	387
						(18) 9,112
						506.0

Average number of days between calves for the herd=506

Note.--Abortion figures not included in the average.

24. We have continued during the year to run a bull with the herd by day and night, the bull's chest being daubed with paint at night to enable services to be recorded. There is no doubt that this system has effected improvement in the breeding rate in this herd, the frequency of services having been equal by day and by night.

Four Ndama cows have accepted services at various times during the year even though they were in calf. It has been suggested that the comparatively slow breeding in the Ndamas might possibly be due to a mineral deficiency in their food. Phosphate deficiency has been suggested as a possible cause of this trouble and this is to be investigated. Our West African Shorthorns on the other hand have bred regularly under similar conditions, but the apparently greater milk flow of Ndamas might be correlated with increased mineral requirements.

The Graded Herd

25. With the transfer of the Nigerian Shorthorn cows and the non-resistant Gold Coast Shorthorn cows to Ibadan the graded herd at Ilorin was left mainly with Borgawas and Borgawa grades. Two Ndama - Zebu cross-bred heifers were also in this herd. All these animals are being graded to Ndama bulls while eight Ilorin Bred Shorthorn - Borgawa crosses are being mated to West African Shorthorn bulls.

Transfers from Ilorin

26. Of the hundred odd Ilorin-bred beasts of various ages transferred to other stations and to native herds the majority have given a good account of themselves. There has however been an outstanding exception in the case of those sent to Umuahia; there Ilorin-bred stock has almost invariably succumbed to trypanosomiasis which in that area appears to be of a particularly virulent type and seriously affects all livestock including the locally bred dwarf Shorthorn. It appeared at one time that Ndamas at Umuahia, after being successfully treated for an initial attack of trypanosomiasis, developed a natural resistance which enabled them to tolerate local conditions, but recent experience has not entirely supported this theory, and it is evident that a great deal of local research will be necessary into cattle breeding for this part of the Eastern Provinces.

It was formerly the practice, in order to relieve congestion at Ilorin, to send young store bulls to Ibadan and Oyo to be kept until old enough for distribution and service. This has been discontinued; all young bulls are now retained at Ilorin until ready for use but in order to make room for them the Nigerian Shorthorn cows and Nigerian Shorthorn grades have been removed to Ibadan where they are bred to an Ndama bull.

DAIRIES

The Yaba Dairy

27. The Yaba dairy continued to operate with cows supplied from Samaru. The present practice is to rail from the north cows either freshly calved or in an advanced stage of pregnancy. These are kept at Yaba during the period of their lactation and are subsequently returned for breeding at Samaru, where they are kept under open range conditions until again due to calve when they are returned to Yaba. This practice has ensured the maintenance of a fairly regular output of

milk at the dairy. Fifty-five cows were received from the north during the year: twenty-five of these were non-pregnant and in milk, having calved between one and four months previously, thirteen were in milk and from one to four months pregnant and seventeen were dry and due to calve soon after their arrival at Yaba. There were no cases of abortion resulting from the train journey. In the opposite direction thirty-six cows were returned to Zaria. These had been at the dairy for periods varying between three months and three years, and were either completely dry or else producing less than two pounds of milk daily at the time of railing. Fourteen of those returned to Zaria in 1944 were not in calf and had in fact shown no symptoms of heat while at the dairy; this phenomenon is being carefully investigated. The other twenty-two were at various unadvanced stages of pregnancy.

Sixty-five cows reached the end of their lactation, the average yield per lactation being 1,890 lbs and the average period of lactation 270 days. The average yield per day during lactation was thus 6.7 lbs. The best individual record (Cow No. W 207) was 4,727 lbs of milk in 423 days or 11.17 lbs per day during the lactation.

28. As regards calves born at the dairy, all heifers are sent to Zaria, together with bull calves whose dams have given more than 2,500 lbs of milk during the previous lactation, other bull calves being culled locally. Thirteen female and three male calves were sent to Zaria during the year.

There were twenty-seven live-births, seventeen of the calves being heifers and twelve bulls; eight of the bull calves qualify for retention. The average "period between calves" was 434 days, the shortest being 320 days and the longest 719 days. In ten cases the period was less than 365 days. Contagious abortion tests are carried out at Yaba and Zaria before cows are railed either to or from the dairy. In connection with calves the use of the live-vaccine "S19" as a prophylactic against contagious abortion has been mentioned already (*see* Shika Stock Farm). The use of this was introduced also at Yaba and all calves are now being vaccinated before leaving the dairy for the north.

The aggregate output of fresh milk was 11,170 gallons, valued at £2,324. No cheese was made this year but sales of vegetables, compost and loofahs amounted to £76, £45 and £14 respectively.

Chemical analyses of the Yaba Dairy milk give average figures of 6.1 per cent fat and 9.2 per cent solids other than fat.

The average results of bacteriological tests gave 500,000 colonies per c.c in nutrient agar at 37°C for two days and 0.001 c.c. *B. coli* presumptive postive.

Experimental Dairy, Moor Plantation, Ibadan

29. Similar arrangements for obtaining a regular supply of milking cows apply to the smaller experimental dairy at Moor Plantation, Ibadan. Here, although breeding has not always been entirely regular we have not experienced the same amount of difficulty in this respect as at Yaba. At Ibadan and Yaba the cows are now exercised with the bull outside the buildings in the early morning when tsetse fly is unlikely to be about, and this may have had a beneficial effect on rate of breeding. With a view to obtaining still more improvement additional arrangements have been made to run the animals in a yard during the night.

The average number of cows on hand during the year was fifteen. These produced 3,534 gallons, or an average of 6½ lbs per head per day. Eleven cows came to the end of their lactation during the year with an average yield of 2,370 lbs per lactation, the lowest being 976 lbs and the highest 3,859 lbs. The average lactation period was 286 days with a minimum of 334 and maximum of 381. Two other cows were deliberately dried off after 165 and 201 days respectively on account of sickness.

There were no cases of Contagious Abortion and no reactors to Contagious Abortion tests. Three cows died from causes unknown and there were two cases of mastitis. Ten calves were born during the year. Two calves which lost condition were found to be suffering from piroplasmosis, the carrier ticks presumably having been brought into the buildings on fodder grass, but they made spectacular progress after treatment.

Dairy Products — Northern Provinces

30. In June 1944 a start was made with the sale of cows to local hand farmers in Kano area, the object being that the farmers would sell milk through a collecting centre on the Government Farm and make farm-yard manure to maintain and improve the fertility of their land. Kano city is short of milk and there are very few Fulani herds within a reasonable distance. The farmers are taught to pen their cows properly and collect sufficient fodder and waste farm products to feed them well in the Dry Season. Those cows which do not prove to be good milkers are fattened and sold to butchers at a profit.

Kano Native Administration Dairy had a very successful year and produced 72,000 lbs of butter. This would have been exceeded but for information received from the Supply Board that butter was being over-produced, and curtailment was accordingly carried out in November and December. The Dairy produced also 1,041 lbs of soft cheese. The Scheme whereby Kano was supplied with fresh milk through the London and Kano Trading Corporation ceased to operate from September, 1944, owing to a breakdown of the firm's refrigerating plant. Up to that time 16,089 bottles had been supplied in 1944. The Kano Dairy was eventually closed down in accordance with Government policy to centralize at one factory at Vom. The Scheme has shown a net profit of a few hundred pounds since the start of operations in 1941.

Fresh Milk Depots continued to operate at Zaria, Gusau and Maiduguri but the one at Sokoto is gradually fading out through lack of demand. In Maiduguri 4,490 gallons of milk and 35 gallons of cream were purchased through the milk scheme; the bulk of this was consumed by the military and European civilians. Cows are purchased in the Northern Provinces for both Government and private dairies in the Southern Provinces. This entails a great deal of work as the cows have to be purchased individually in Northern Katsina Province, then sent to Samaru Government Farm where they are tested and sorted out before dispatching to the Southern Provinces.

Cattle Control, Kabba and Ondo Provinces

31. At Kabba the control of cattle has been in operation since 1941 and in the past two years a small dairy industry has been developed there. In order to make this a permanency and also with the object of noting any improvement in milking capacity shown by the progeny of bulls which have been running with the

herd for three years, this dairy scheme was taken over by the Department in June 1944. Since then 121 lbs of butter has been made at an average of 1 lb of butter from 20 lbs of milk. A satisfactory feature of this dairy is that much of the butter is bought by Africans.

Cattle control at Okene was not begun until 1943 but it was greatly extended in 1944. In Okene area, control of cattle is a necessity on account of heavy population and consequent shortage of farmland, which is aggravated by wandering cattle. Advantage was taken of the cattle control to develop the herds. This had been begun on a small scale in three herds in 1943, but the scheme now embraces all cattle in Igbirra Division comprising about twenty separate herds. Results have been good in some cases, and there is little doubt that there are far greater potentialities for economic development of cattle in Okene area than in other parts of Kabba Province. A dairy was built, but work had not started before the end of 1944.

Bulls from Ilorin Stock Farm have been running with herds at Kabba and Isanlu Makatu since 1941 and at Okene in more recent years: 1943 and 1944. Some study of the effects of these bulls has been possible in Kabba and Isanlu. The progeny of the bulls are a marked improvement upon their dams, both as to size and conformation. The improved heifers at Kabba were separated from the rest of the herd to prevent their being served while too young. Heifers of 18 - 24 months, sired by selected bulls, have been sold for £7 or more each, a much higher figure than that usually obtained for local stock of the same age. Improvement of type is not yet obvious in the Okene herds, as the bulls have not been with them long enough but the demand for bulls by herd owners is far greater than the available supply.

Many of the larger villages in Ondo Province own herds of dwarf cattle. These are never cared for, are semi-wild and do considerable damage to crops. Breeding is entirely uncontrolled and therefore takes place among closely related and immature animals. A start has been made in controlling these herds by persuading the owners to hire herdsmen, and by building pens for kraaling the cattle at night. The position is not yet entirely satisfactory, chiefly because the payment of wages to herdsmen is irregular, but 26 herds, comprising nearly 500 cattle have already been brought under control. Once herded it will be possible to improve them with a supply of bulls from the Ilorin Stock Farm and by selection of selected locally bred bulls.

POULTRY

32. The breeding and distribution of Rhode Island and Australorp birds was continued, and special attention has been given to the improvement of native birds by selection.

Six purchased Nigerian cocks were mated with the best of some 200 purchased hens, and the progenies toe-punched according to sire. One cock (No. 101 ex Oyo) proved outstanding, as regards both his own fertility and longevity and the egg-production of his daughters. The remaining cocks and their progeny, and most of the purchased hens were sold. The daughters of cock No. 101 were egg-recorded and the best were mated back to No. 101 to concentrate his characters. The best of the resulting inbred grand-daughters have been mated with the best seven of his inbred grandsons. The earliest of these twice inbred progeny have been recorded, and so far two (ex cocks 2 and 3) appear to be quite up to standard. The progeny of these two cocks have been mated with the best of their brothers.

From the start it was realised that cock No. 101 was not perfect, having a tendency to beget leggy birds laying small eggs. Attempts have been made to offset these character by mating him with deep-bodied daughters laying large eggs (N.B.—There is a good deal of evidence that the record layers as regards eggs, lay small eggs.)

To guard against too great degeneration and also to bring in new genes, the best three cocks at the 1944 Oyo Show were purchased, and are being mated with the twice inbred daughters of No. 101. The best progeny will be retained and line-bred for one or two generations.

PIGS

Northern Provinces

33. The production of bacon pigs on the Government Farms at Minna, Samaru, Shika, Zonkwa, Daudawa and Bauchi continued to expand as shown by the following figures for output:—

Bacon pigs of 180 lbs all produced at Agricultural Departmental Piggeries:—

1941 = 4 (= 720 lb live weight)
1942 = 450 (= 81,000 lb live weight)
1943 = 1,930 (= 347,400 lb live weight)
1944 = 4,545 (= 818,100 lb live weight)

The Department set out to produce 400 bacon pigs a month for supplying to the Cold Store and Holt's, of Lagos, and this target was achieved by the end of 1944. The original herds consisted of middle and large white cross-breds, and Duala pigs from the Compagnie Pastorale. Pedigree boars of the Large White breed were imported from the United Kingdom and our breeding policy has been to grade up to this breed. An excellent type has been developed which is very well suited to the bacon trade. A great deal of effort and research have been put into this industry and the Department has received the assistance of Veterinary Officers in dealing with health and nutritional problems. Private piggeries supplied with breeding stock from Government Farms made good progress during the year. One such piggery at Kano now contains several hundred pigs while three piggeries at Minna contain 150, 60 and 40 good quality breeding stock. These piggeries are of up-to-date construction, and feeding and management are on sound lines. Other piggeries are developing, namely, at Gusau, Kaduna and Zaria. It is proposed to set up Africans as pig breeders at Zaria in small units capable of providing their owners with a reasonable income. As these private piggeries develop our own will cease to operate on commercial lines, but it will be necessary to retain Shika piggery as a breeding depot for pedigree boars, and possibly Minna piggery for breeding and selection of a suitable type of pig for the local villages. The health of the pigs remained good throughout the year except for small outbreaks of disease which were dealt with by the Veterinary Department. Excellent result were obtained from the feeding of blood meal which was produced by the Medical Department from the waste blood at the abattoirs at Kano, Zaria and Kaduna. The Duala strain is being maintained at some of our piggeries as a standby in case of unforeseen trouble in the future with the pure bred English stock. The Sleeping Sickness Service at Anchau have distributed pigs to local farmers, and in 1944 these farmers and the Anchau home farm produced 600 weaners for sale to the fattening pens at Samaru. In Maiduguri the Agricultural Officer has a piggery for supplying pork to the Military and European civilians from which 6,647 lbs were sold in

1944. Several pure bred boars were supplied from the Northern Provinces Piggeries to the Southern Provinces for breeding purposes. At Bauchi pagan farmers sell their weaners to the Department's Piggery where they are fattened for sale to the Lagos Cold Store.

Southern Provinces

34. At Moor Plantation and Agege pig breeding centres have been established for distribution of stock in the Western Provinces, and at Umuahia for the Eastern Provinces. So far distribution has been confined to half-bred, three-quarter bred and a few seven-eighth bred animals. It is considered probable that a proportion of native blood will lead to greater tolerance of disease and local conditions but experiments will be continued with all grades as well as pure bred stock in order to obtain definite information on this subject.

GOATS

A great deal of observation and experimental work has been done on the management of goats at the Department's Farms at Bauchi, Daura, Kafinsoli, Gusau, Sokoto and Kano. It was once hoped to evolve an economic system of keeping goats under enclosed conditions in order to limit the widespread damage which these animals do to young trees when on open range; experience to-date has not produced a successful system which can be recommended to farmers, although a vast amount of information has been collected. Goats are valuable producers of farm-yard manure, meat and skins and their number in the Northern Provinces justifies experiments in management.

Agege Cattle Fattening Scheme

35. Mention was made in my last annual report of the establishment of a cattle fattening centre at Agege. The object of this scheme is to study methods of feeding and management and the economics of fattening cattle brought by rail from the North. Information is being obtained on the best type of animal for fattening, suitable rations, period of feeding, cost of production, market values, etc. The farm now has ten pens capable of housing 168 beasts. Eighty acres of elephant grass and eighty acres of guinea grass have been planted to provide fodder and also forty acres of cassava; in addition locally obtainable concentrates such as cotton seed and palm kernel cake are used. Indications so far obtained are that no type of beast fattens better than the White Fulani, and some types are distinctly inferior. Quickest results have been obtained by feeding 10 lbs per day of concentrates, and unlimited fresh grass of which some beasts will consume as much as 100 lbs daily.

There has been wide variation in the rate of weight increase. The quality of the meat has been commented upon favourably, the best animals killing out at 55 per cent dead weight with a large proportion around 50 per cent. The majority of beasts were sold to the Cold Storage Company. Prices obtained showed a margin of profit after allowing for all expenses.

Towards the end of the year we unfortunately experienced an outbreak of pleuropneumonia which resulted in a large number of losses and necessitated salvaging all the stock on hand and making a fresh start.

At Abeokuta a smaller subsidiary scheme was begun during the year.

FODDERS AND PASTURES

36. The experiments on grasses and pastures, have been continued and expanded by the Botanists, and on a field scale by Agricultural Officers. Valuable information has been obtained of suitable species for various purposes, methods of establishment, management and utilisation. Systems of haymaking for the provision of dry season keep have been carefully studied, and special attention has been paid to the production of green fodder as late as possible in the dry period. Silage trials have been undertaken at Moor Plantation with some degree of success.

Some of these investigations cover short period only—others must continue over a number of years before providing the desired information. At Ilorin Stock Farm improvements have been made in the stock carrying capacity of the grassland.

A programme of pasture research which had been proposed for the Bokkos Cattle Range in Plateau Province has been postponed on account of staff shortage.

SOIL CONSERVATION

Northern Provinces

37. Mr G. Browne, Agricultural Engineer, visited South Africa and Rhodesia to study methods of anti-erosion work, and his report shows that a great deal of the kind of work in progress in those countries is applicable to Northern Nigeria. Propaganda has been undertaken in the Provinces by means of talks with District Heads and farmers of the damage caused by faulty ridging and the lack of sufficient numbers of trees on farms. Staff is employed in Katsina Province for propaganda on anti-erosion measures. Broad-base terracing and grass strips have been introduced on the Government and Native Administration Farms, and an appreciable amount of progress has already been made with this work in Samaru, Daudawa, Shika, Riyom and Daura.

38. The "kurmis" or deep valleys of Northern Nigeria contain good soil, and are a valuable asset to the agricultural community. This is not always fully appreciated, elsewhere, but in Southern Zaria the farmers are forced to use the kurmis through shortage of other fertile land. They wish to plant food crops and ginger, but if they cut down the trees and bush, the soil erodes and the kurmis are ruined. Ruined kurmis are all too plentiful in this area, and an attempt is being made at a large kurmi near Zonkwa farm centre to evolve means of soil conservation which will enable the land to be farmed without creating erosion and loss of fertility. This is a most important line of work which bears close relation to the present large scale clearing of kurmis by the Sleeping Sickness Service. Such clearing provides erosion risks if farmers plant crops near these cleared streams. The work at Zonkwa includes protective broad-base terraces, contour ridges and dams for conserving water for dry season farming. Although the work is on a very small scale the results are promising.

Eastern Provinces

39. Most of the Districts of Owerri and Onitsha Provinces are affected by erosion. It is particularly serious in north-west Owerri (Okigwi, Orlu, Bende), and in Onitsha Division (except north and west of Anambra River), Awka and Udi Divisions, Western Awgu and central and Southern Nsukka. In these areas both sheet and gully erosion have occurred and are continuing to occur, gullying being

particularly bad in the Ide Mili valley and the Nanka and Aguata areas of Awka. In Ogoja and Calabar Provinces the main damage has been brought about by destruction of soil cover and vegetation. In the Cameroons Province comparatively little accelerated erosion occurs, the soil conditions being favourable to rapid absorption of water. The worst dangers from erosion, as opposed to soil deterioration through excessive cropping, are found in Onitsha and Owerri Provinces. The measures so far adopted have included rules made by various Native Administrations to control burning and to define farming areas in some parts of the Provinces concerned. Propaganda has also been carried out by the Agricultural and Forestry Departments. Demonstrations of methods to check erosion have been made at Nkwele Farm, Udi and elsewhere. Detailed schemes have been prepared for larger scale work in the Onitsha Province, based on approved treatment of some six and one-half square miles at the head of the Ide Mili Valley.

Western Provinces

40. In the Western Provinces there does not seem to be any serious erosion. The greatest dangers are from bad farming on hillsides or river banks, or bad siting of roads which cause excessive run-off. Generally speaking, the cover which develops after farming is satisfactory and the population is nowhere so excessive as to cause land hunger and over-farming. Permanent crops such as cocoa, kola, etc., give almost as good a cover as the bush itself.

CHEMISTRY SECTION

Eastern Provinces

41. The soil work of the Chemical Section continues to be concerned mainly with the Eastern Provinces and oil palm cultivation. An active part has been taken by this Section in further experiments at Umuahia and Nkwele on the use of lime and other manures, with contour ridges and strips, and with acioa and other shrub fallows. No evidence has yet been obtained to show that any other factor (such as soil structure, micro-organic population, or minor-element deficiency) is of comparable importance with the availability of potash, phosphate, nitrate and lime in these soils.

It is intended that systematic soil surveys will be undertaken in the Eastern Provinces; these will include the characterising and mapping of distinguishable soil types (starting with selected important areas). They will include also detailed studies of the fertility level maintained in different categories of land—such as compound land, communal land, rotational bush-fallow areas and palm groves. Some preliminary field and laboratory work along these lines has been carried out during the past two years. For example, the extent of the deep sandy soils having very free internal drainage (the Acid Sands group), which are derived from materials included in the Upper Cretaceous, Pre-Middle Eocene, and Post-Middle Eocene Formations now mapped by the Geologists, has been roughly determined. These are the main soils that are liable to become intensely acid when cultivated, but analyses have shown that the present degree of acidity of any particular plot of ground depends on its past history and whether or not it receives any manurial matter such as ash and general refuse. This fact is of particular importance in considering the use of agricultural lime, because crop yields do not appear to be affected by acidity in Nigerian soils until the pH value falls to five or even less.

Oil Palm Research Station

42. At the small laboratory opened at the Oil Palm Research Station at the beginning of 1944 work has consisted mainly of regular determinations of the nitrate and moisture content of the top six inches of soil in the two main cultural experiments, where clearing and the planting of palms took place in 1940. One of these experiments compares the effects of burning the felled bush after the original clearing, with allowing it to decay without burning. The analyses have shown throughout the year a consistently higher amount of nitrate in the Non-burning treatment than in the burning. The second experiment is more complicated, but the salient feature of the analytical results is that the leguminous cover (a mixture of *Pueraria* and *Calopogonium*) has always maintained an appreciably better nitrate supply than any other treatment, with the exception that during November, December and January there was distinctly more nitrate and moisture under the bush cover allowed to grow to a height of ten feet (the palms being in " rides ").

43. The nitrate-content started at a fairly high level in all the cultural treatments at the beginning of April. It then decreased fairly rapidly until the middle of May, indicating that at this stage the rate of removal through leaching and absorption by plant roots exceeded the rate of nitrification of the soil organic matter. Figures for the different treatments then remained more or less constant (except for a small temporary increase during the drier weather of July and August) until the beginning of November. During the dry season there was a steady accumulation of nitrate; it is presumed that the rate of nitrification fell off as the soil dried out, but that the absence of leaching and the lower rate of absorption more than counterbalanced this. The light showers which occurred after the middle of February 1945 and a single heavy fall of rain at the beginning of March stimulated nitrification, and peak values (between 13 and 30 parts of nitrogen in the form of nitrate per million parts of soil, depending on the cultural treatment) were then reached, a falling off due to absorption by roots being noticed before the end of the month.

Soil Deficiency at Moor Plantation

44. During the last three or four years crops on the classical rotation blocks on Moor Plantation have sometimes been poor, and, as this appeared to be the result of partial failure of the preceding green-manure crops (mucuna and popondo), special attention was given to the establishment of these crops in 1944. They were planted early and germination and growth were excellent. In some blocks early maize made poor growth at first and was then completely smothered by the green manure, so that the average yield of early maize for the year was comparatively low. On the other hand yields of late maize, following the good green-manure crops, were high, indicating a satisfactory restoration of fertility.

45. A statistical experiment with artificial fertilizers was carried out by the Agricultural Chemist on the early maize crop in two of the rotation blocks where the previous crop had been very poor, with the object of discovering whether one of the major elements had become deficient. There were already strong indications that lack of nitrate was the factor concerned, and the results proved that this was the case. Phosphate (4 cwt per acre of basic slag) and Potash (1 cwt per acre of the sulphate) gave negligible increases in yield, whereas nitrogen (2 cwts per acre of sulphate of ammonia) had a great effect, especially on the poorer of the two

fields, as shown by the following figures for the yields of maize (in lbs of dry grain per acre):—

	Field Z5S	*Field B4W*
Average of all plots receiving nitrogen	1,166	1,705
Average of all plots without nitrogen	557	1,328

The highest of these yields is fairly good, for the local variety of maize. The conclusion is therefore drawn that there is still no deficiency of phosphate and potash in these two blocks, after more than twenty years' continuous cropping without manures other than green-manure, but that the result of unsatisfactory growth of the green-manure is a serious deficiency of available nitrogen. So far as phosphate and potash are concerned the results are in accordance with the theory that the supplies of these elements are maintained in the Ilepa group of soils by the continued decomposition of rock minerals within reach of plant roots, which was mentioned in last year's Annual Report.

IRRIGATION

46. Minor schemes of earth dams with improved irrigation channels continued to operate successfully in Niger Province. When the Irrigation Engineer from Sierra Leone visited Bida he was of the opinion that there were great possibilities for irrigation schemes in that division. Near Wuya on the Kaduna river an area of about three square miles has been selected as a promising site for an irrigation scheme and preliminary investigations are under way. Further progress is held up pending the arrival of a seconded Public Works Department Engineer and an Irrigation Engineer who are expected in 1945. Small temporary dams continue to be constructed in all Divisions of Niger Province for observation purposes. At Riyom in Plateau Province a dam was built by local farmers for potato production in the dry season. Twenty farmers made an income of £5 each in the 1943-44 season, and this year the number of farmers growing irrigated potatoes has increased to seventy. At Hoss near Riyom about sixty local farmers prepared potato plots under the guidance of the Agricultural Officer and carried out a scheme of irrigation by gravity from springs. There is room for further expansion in this valley, and more farmers are expected to join the Scheme in 1945. Small scale irrigation schemes are operating in many other Provinces, particularly in Zaria and Southern Katsina where the dry-season potato crop depends upon irrigation.

EDUCATION

School of Agriculture, Ibadan

47. The School Staff was augmented by a second Science Master, trained at the Higher College, and the Assistant Agricultural Officer on the Staff was sent to Trinidad for further studies. The Agricultural Assistants' Course, as a result of last year's experience, has been increased to three years, the second year being spent on outstations.

Diploma Classes.—The four students, including two from the Gold Coast who arrived late for the last class, successfully completed the Course. A total of twenty-five students have been awarded Diplomas to date. Seven Higher College Students and two Gold Coast Students took Finals Part I.

Agricultural Assistants.—Nine assistants recruited in 1942 completed their training, one having obtained distinction in both Finals Parts I and II. Seven Assistants who were recruited in June, 1943 and sixteen who were recruited in April, 1944 completed their first year of school work and were posted to outstations for their second year of practical work. A new class of twenty-five Assistants was recruited in January, 1945, including three Field Overseers who have proved to be outstanding men over two years of Field Work.

Field Overseers.—A special course was arranged for ten Field Overseers from Horin, Okene, Yandev and Bamenda where it is almost impossible to recruit Middle VI boys. These Overseers have passed Middle IV and after spending twelve months at Ibadan, will proceed to Samaru, Zaria, for further training.

School of Agriculture, Samaru

48. This was a transition year from the old system, where assistants spent their first two years at the School, and proceeded to outstations at the beginning of their third year, to the new system where the first and third year are spent in the School and the intermediate one at outstations. As a result, there was no class completing its training during the year, and no assistants passed out of the School.

The School year began in May with a first year class of fifteen (seven from the Northern Provinces) and a third year class of eight, three of the original eleven having resigned. Five of these eight are from the Northern Provinces. Of the first year class, two subsequently resigned; the appointments of four others were terminated on failure to obtain their School Certificates and these were re-appointed as Field Overseers.

Of the seven Northern Provinces members of the first year class, only two have the full Middle VI qualification, the remaining five having been appointed to the sub-scale of the Agricultural Assistant grade, their qualification being at least one year in class Middle VI. This procedure was adopted experimentally in 1944 in order to try to increase the number of Northern students in the school.

Farm School, Oyo

49. The Farm School at Oyo has been in operation for three years and while it is still premature to make any pronouncement regarding its success, it is now possible to assess more clearly the kind of problems which must be encountered.

Only one class of students so far has actually passed through the School and taken up farming. This was the first class recruited in 1942. These students had left their Elementary Schools several years before admission to the Farm School. They received only one year's training and began settlement in 1943. Of the twelve boys originally recruited, ten are still farming and most of them are making very satisfactory progress. They are now well established and will shortly be reaching the stage when their cattle breeding work should appreciably enhance the financial returns from their mixed farming methods.

The second class, recruited in 1943, were taken straight from elementary schools and were consequently considerably younger than their predecessors. They received two years training before going out to their farms in January, 1945. Very little can be said as yet of their progress. The general behaviour and industry of this class during their period of training were far from satisfactory, so much so

that it is questionable whether the elementary schoolboy is of the right age or the right type of youth to select for training for farm settlement. Of the twelve boys originally selected six had to be dismissed owing to their lack of discipline and reluctance to do manual work.

It was hoped that the scholarship scheme would attract some of the brighter boys from the Oyo Schools, but it is now clear that considerable prejudice exists among parents as well as their children against boys taking up farming after leaving school. Elementary schoolboys too frequently prefer a life of idleness to farming, if they fail to obtain employment in the much coveted salaried careers. This is quite understandable since farming by the traditional methods of the country seldom offers remuneration equivalent to salaried employment. Until the success of the Farm School scheme has been demonstrated by settlers who make good, there is no obvious inducement for others to return to the land.

In 1945 it is intended to open the scheme to sons of farmers in the Oyo district regardless of their standard of education. Such boys will be mainly illiterate on entry. They will form an interesting comparison with elementary schoolboys and, it is hoped, will help to solve the problem of selecting the best type of student for farm settlement.

Imperial College of Tropical Agriculture, Trinidad

50. Seven members of the African Staff, comprising one Agricultural Officer and six Assistant Agricultural Officers are attending courses at the Imperial College of Tropical Agriculture, Trinidad. These officers have already completed several years service in the Department and have shown sufficient ability and industry to merit further training.

SETTLEMENT SCHEMES

51. A detailed settlement scheme for ex-soldiers has been drawn up by the Senior Agricultural Officer at Daudawa, based on the present civilian settlement scheme at Daudawa. The present small settlement of sixty settlers is making satisfactory progress and the settlers are contented and comparatively wealthy. The basis of their prosperity is a thrift society supervised on their behalf, for experience has shown us that most failures in mixed farming are due to improvidence. In good years farmers tend to waste their profits on luxuries and they have little idea of saving against a rainy day. In the Eastern Provinces an agricultural survey was made of the proposed new Mamfe-Calabar road with a view to finding a suitable area for possible land settlement. The most promising area for this purpose appears to be between Nkame (87 miles from Calabar) and Ikpai (76 miles from Calabar) but a more detailed survey of the particular area will be necessary before definite recommendations can be made.

A small settlement scheme is already in operation in connection with the Oyo Farm School.

OIL PALMS

52. Despite the fact that little or no propaganda was carried out of the encouragement of oil palm planting in 1944, interest in planting, probably stimulated by improved prices for palm produce, was more than maintained. This applies particularly to Aba and Bende Divisions of Owerri Province. A substantial

increase in requests for planting material for 1945 has been noted in Oyo Province. We continue to find a falling off in yield in our experimental palm plots after about the ninth year, but comparatively few complaints have been received from native planters in this respect. However, judging from the appearance of the palms, it would appear that few privately-owned plantations are likely to be yielding more heavily than our own plantations. Arrangements have been made for yield recording on a number of private plantations.

Small scale cultural and manurial experiments, necessarily curtailed by the limited available resources for such work, have been initiated on our own farms and native owned plantations but the falling yields illustrate the pressing need for more intensive research into the problems which have arisen. Although the orthodox planting and cultural methods hitherto tried have not been promising, we have grounds for the belief that by means of research a successful method can be evolved of cultivating palms on the acid sand soils, which would be a sound economic proposition for the African farmer.

Palm Oil Machinery

53. The palm oil press repair service started in Owerri-Calabar in 1943 was continued, and some 140 presses were repaired during the year. Thirty-six new presses are known to have been purchased in this area and eight in Onitsha-Ogoja. There are still many presses requiring repair and there is a large and growing demand for new presses particularly in the Okigwi, Orlu, Owerri and Bende Districts of Owerri Province. Hand-operated nutcracking machines are not nearly so popular as presses, and, although a number of new machines became available in the latter part of the year, the greatest difficulty has been experienced in disposing of them even with a reduction in price from £29 to £25.

Oil Palm Research Station

54. Throughout the year there was only one Botanist stationed at the Oil Palm Research Station but the normal programme of expansion has been maintained in spite of a continued shortage of staff and equipment. In the course of the year sixty acres of land were planted at the Research Station and a further five acres at Ogba Farm. A total of 520 acres has been planted at the Research Station.

The greater part of the year's planting was made with the progenies of high yielding selected palms which are being tested for the inheritance of yielding capacity fruit types, and other factors. It also included an experiment to test the best technique for transplanting young palms to the field, important in view of the heavy transplanting losses suffered in the last two years.

Of the experiments started in earlier years the results so far indicate:—

(*a*) Clearing and burning the bush for the establisment of a palm plantation shows no advantage over non-burning, as judged by the effect on the early growth of the palms.

(*b*) Palms grown with interplanted food crops, as in native practice, develop more quickly than those grown with a high or low bush cover or a leguminous cover. It remains to be seen, however, whether the added drain on the soil of the crops will not be manifested in lower yields in years to come.

A small chemical laboratory was built during the year for carrying out routine fortnightly soil analysis.

The small herd of cattle, kept mainly to produce manure, for trial on the palms, has remained in good condition and an N'dama bull has been obtained from Ilorin for the purpose of grading up the local dwarf cattle to a larger and more useful type.

With a view to establishing a village settlement for the African Staff and labourers, who now number from 250 to 300, a further 300 acres of land have been acquired bringing the total area of the station to 4,285 acres.

Chemical Notes on Palm Oil

55. Investigations of quality in palm oil have continued, and it has been pointed out that there is a distinction between acidity and rancidity. The free acids, mainly oleic and palmitic, produced by hydrolysis of palm oil are non-volatile and do not have a strong taste or odour. Rancidity is due to the presence of small quantities of nauseating substances produced by a complex process of oxidation. Rancidity is of little importance in exported palm oil, because the substances responsible are fairly readily removed by treatment with steam. To be of the highest quality for local purposes palm oil is required to be entirely free from rancidity, though it need not have a very low percentage to free fatty acid. The average free fatty acid of samples of the recognized first-quality food oil sold in Umuahia market was found to be eight per cent, while the recognized second quality gave a figure of thirteen per cent; a type of oil containing about thirty-three per cent free fatty acid but free from rancidity, used for preparing special food dishes, was also being sold.

56. In some areas the oil normally used in the past for food purposes has been of the semi-hard type. Elsewhere such oil has been disliked, and it is interesting to note that, in order to cater for the local Bini market, Sobos who are traditionally makers of " hard oil " utilizing the fruit from wild palms at the Oil Palm Research Station have modified their usual " semi " oil process by softening the fruit by boiling instead of fermentation before proceeding to mash it with water and separate the oil by flotation. This modified process is practically identical with the usual Yoruba or Bini process, except that the fruit is mashed with the feet in the traditional old canoe instead of with poles in a hole in the ground. The same change in the wet process of extraction has taken place to a large extent in the Arochuku area but, in this case, on account of commercial prices.

57. One of the reasons for the development of free fatty acid during extraction by the common " soft oil " method is that fruit is often considerably bruised in the process of removal from the bunch; also there is liable to be a fairly long delay before it is cooked, especially where screw presses are in use and large quantities of fruit are dealt with. A series of careful experiments has shown that the most satisfactory method of separating fruit from the bunch is that of cutting off the spikelets with the point of a cutlass and spreading them out for two days; after this period the fruit will have become loose and easily picked out. Provided that the bunches are harvested at the right stage this process results in oil with only three per cent free fatty acid. Still lower figures have been obtained by boiling whole bunches or even the separate spikelets in large drums, but the labour required renders this improvement unprofitable.

58. The South American beetle, *Pachymerus lacerdae*, Chev., was found to occur throughout the wetter parts of the Oil Palm belt and has evidently been present there for at least twenty years. The larvae occur in nuts on the ground and lodged on the tree; but the female beetles do not appear to oviposit until the mesocarp has begun to decompose. Regular harvesting should prevent damage to the kernels.

COCOA

59. *Botanical Work.*—One of the main objects of cocoa selection is to improve yield and the quality of the beans. A measurable and heritable character used in assessing the quality of cocoa is the size of the bean; for cocoa to be graded as Main Crop the weight of a sample of 300 beans must exceed eleven ounces. For the average Nigerian cocoa the weight of this sample is about 11.8 oz., but it is lower when the tree is young, and also in the season of the light crop. Young trees, planted between 1933 and 1935 at Moor Plantation, the Ibadan Native Administration Cocoa farm, and at Owena, the progenies of selected parents, are being examined for the weight of their beans. The early indications—and the figures may improve as the trees mature—are that the progenies of a tree bearing the number T38 are producing beans heavier than the average, as may be seen in the following table:—

Station	*Duration of Observations*	*Weight in ounces of a sample of 300 dry beans:*	
		Progeny of T38	*Progenies of other Selections*
Moor Plantation ..	6 years	12.7	10.7
I.N.A. Farm	3 years	12.8	11.3
Owena Farm	2 years	13.3	11.5
Average..		12.9	11.2

It is too soon to make a detailed comparative analysis of the yield of the various progenies at these stations, but the progeny of T38 are in this respect as good as others, and seed from this tree, and from rooted cuttings of it, will be used to replant areas when trees infected with Swollen Shoot have been cut out.

60. Selections introduced from Trinidad have produced beans weighing from 9.2 up to 22.1 ounces for samples of 300 dry beans. Unfortunately those producing the largest beans are largely self-sterile, and cannot be used for breeding with the local types as they bear but few pods.

The usual method of planting cocoa in Nigeria is to sow seed at a spacing of about 4 feet by 4 feet in the heaps where a food farm has been made; and the cocoa is thinned out to 8 feet by 8 feet or more as it comes into bearing. Experiments at the Ibadan Native Administration Cocoa Farm, planted in 1934, indicate that this method of close planting is economically sound. The best three one acre plots at the different spacings used, planted on good Ilepa clay gave the following yields in their tenth year:—

15 feet by 15 feet	.. ..	303 lb dry cocoa per acre
12 feet by 12 feet	.. ..	329 lb dry cocoa per acre
8 feet by 8 feet	.. ..	831 lb dry cocoa per acre

The close spacing compares favourably in yield with recorded native farms of similar age.

The 12 feet by 12 feet plots have one and one-half times as many trees as the 15 feet by 15 feet and the 8 feet by 8 feet have three and one-half times as many; and it might be expected that in the early years — before the trees begin to interfere with their neighbours — the yield per acre would correspond roughly with the number of trees per acre, but the following figures, based on weights of wet beans, show that the yields for 8 feet by 8 feet are higher, and those for 12 feet by 12 feet lower, than expected:—

Spacing	*Trees per Acre*	*Density Ratio*	*Yield Ratios:*				
			6th Year	*7th Year*	*8th Year*	*9th Year*	*10th Year*
Feet *Feet*							
15 × 15	193	1	1	1	1	1	1
12 × 12	302	1.5	0.6	1	1	1.1	1
8 × 8	680	3.4	6.7	4.4	3.8	3.0	2.7

A new experiment, planted at the Ibadan Native Administration Farm in 1942, with seven densities ranging from 1,742 trees (5 feet by 5 feet) to 193 trees (15 feet by 15 feet) per acre, is showing that closely planted cocoa grows better than widely planted in the early years.

61. The limiting factors in the Nigerian cocoa belt are Capsid bugs and drought. The control of capsid bugs is now under investigation. Work carried out in conjunction with the Agricultural Chemist has shown that the effects of drought during the dry season do not occur in cocoa planted on the deep Ilepa clays. These clays occur on the upper slopes of the contours, and that is why native cocoa in Oyo Province is not continuous but grows mostly on the higher ground. Cocoa does not usually grow on the sandy soils of the lower slopes because they dry out in the dry season. In one block (E6) on Moor Plantation two plots of cocoa at 15 feet by 15 feet on sandy soil are giving yields equal to plots of equivalent age and spacing on good soil at Ina. In the E6 plots there is good overhead and side shade, the young cocoa plants are watered during each dry season until they become established and they have been manured for three years with cocoa ash at 4 cwts. per acre. It is not known yet if such treatment could be carried out economically.

Propagation of T38 by rooting cuttings has been contrived in oil palm seed germinators. Many failures were encountered during the rainy season, possibly due to low temperatures, but about 25 per cent success was achieved during the dry months. Much more uniform results should be obtained in a new propagator built specially for cocoa work.

62. *Cocoa Survey.*—In view of the vast amount of damage sustained in recent years by cocoa in the Gold Coast, especially as a result of Swollen Shoot Disease, and of the obvious deterioration of large areas of cocoa in Nigeria, it became apparent that a comprehensive survey of the cocoa growing areas in this country was immediately necessary. All aspects of the industry required investigation including disease, insect pests, soil, yields, age of plantations, areas suitable for future planting, etc.

African Staff comprising in all ninety-five men have been recruited and trained, their training including a visit to the Gold Coast for the purpose of studying the crop in a more advanced stage of deterioration than that reached anywhere in Nigeria. A number of European Officers and members of the permanent African Staff of the Department also visited the Gold Coast for the same purpose. A start was made on the survey in November and before the close of the year Swollen Shoot disease was found to be present in two separate areas in Oyo Province.

Provision was made for the appointment of three Production Officers for the express purpose of the Cocoa Survey but these have so far failed to materialise. Meanwhile, in view of the urgency of the work, it has been necessary for Agricultural Officers to put aside other important work in order that the survey be no longer delayed.

HEVEA RUBBER

63. The early part of our wartime rubber campaign consisted of ensuring that all possible trees were tapped and that the maximum quantity of rubber was obtained for export. Subsequently our efforts have been directed towards the improvement of quality by means of the distribution of equipment and materials, demonstrations of tapping, collecting and preparation for the market and official inspection and grading of rubber offered for sale. In the main producing area of Benin-Warri Provinces practically every farmer who owned a rubber plantation received at least one visit from a member of Agricultural Department staff and was given instruction during that visit. Budded plants of *Hevea* rubber obtained from the Cameroons are being grown at Benin and budwood of two clones, Waringiana four and Badjong Datar five was obtained from the Firestone Rubber Company, Liberia. Unfortunately, owing to very dry conditions at the time the budwood was received, only nine budded plants of Waringiana have been produced at Ibadan. These will be transferred in due course to Ogba Farm, Benin, which will be the main centre for any future botanical work in connection with rubber.

KOLA

64. Kola plots at Moor Plantation continue to show wide variations in yield from tree to tree. Experiments indicate that both budding and the rooting of cuttings are possible, and the vegetative propagation of high yielding self compatible white kola trees by these methods is now being undertaken for distribution to farmers. Unlike cacao, which must be planted close, kola, like citrus, can be planted at densities of sixty to the acre or less, and so budded plants can be issued to farmers economically. When properly organized this method should ensure better yields than that of planting nuts at stake. The white colour of the nut is assumed to be a recessive, so that flowers on a tree grown from a white nut which are self fertilized or crossed with pollen from other trees of white nut origin will only produce white nuts. At Ina twenty-seven of the 299 nuts were pink or red, and this is presumed to be due to out-pollination with wild kolas in the nearby forest. Similarly the white kola plot at Nkwele gave 2,475 nuts, of which five were red. All these five red nuts came from one tree, NK16, which also produced white nuts. In this case the foreign pollen must have come some distance, possibly carried by an insect.

COFFEE

65. The coffee grown in Nigeria in the past was of the Liberica type which, though a fairly heavy yielder, is of poor quality. The best type, Arabica, will not grow at low elevations, so in 1930-1931 the Department introduced various types of Robusta, which is of much better quality than Liberica.

The following figures show average annual yields in pounds of fresh berries per acre for the Robusta introduction in Departmental plots:—

Type	*Agege*	*Ibadan*	*Ina*	*Onitsha*	*Umuahia*
	1937-43	*1936-43*	*1941-43*	*1936-43*	*1935-43*
C. C. Robusta ...	—	270	—	—	631
Java Robusta ...	429	383	1,508	1,134	762
Java Uganda ...	—	278	—	—	354
Java Quillou ...	—	1,195	—	—	1,448

The ratios of fresh berries to clean seeds have been Gold Coast Robusta and Java Uganda 4 : 1; Java Robusta and Java Quillou 5 : 1. For comparison the Liberica types have been 7 : 1 or higher. Both Java Robusta and Java Quillou, a Robusta type, appear suitable for distribution. There are isolation plots for seed production of Java Robusta at Onitsha and Ina and for Java Quillou at Owena.

FRUIT

Citrus

66. In 1932 trials to test various stocks for budded grapefruit and oranges were laid down at Moor Plantation and Agege. The following table shows the yield of marketable fruits per tree per annum for the ten years 1935-44 at Moor Plantation.

Stock	*Grapefruit Scion*	*Orange Scion*
Sour Orange	545	539
Acid Lime	423	462
Sweet Orange	347	498
Grapefruit	332	228
Tangerine	323	402
Rough Lemon	297	145
Shaddock	238	192

These figures show that the best yields are obtained from Grapefruit and Sweet Orange when budded on orange stocks, and similar comparative results have been obtained at Agege. Sour Orange is resistant, though not immune to the Gummosis disease which attacks the base of the trunk of most other citrus varieties. This resistance is aided by budding not lower than 18 inches above soil level, by making the trees branch at least 54 inches above the ground and by keeping the soil round the trunks clear of bush growths. Unfortunately Sour Orange is susceptible to scab disease, which attacks the leaves and young shoots, and control measures increase the nursery costs. The local Nigerian Green Orange and Sampson Tangelo, which are apparently very resistant to Gummosis diseases, are now being tried on root stocks.

These citrus plants are spaced at 27 feet triangular, equivalent to 60 trees per acre, so that an acre of citrus in the neighbourhood of Ibadan should give very large numbers of fruits if properly cared for. In some seasons yields may be greatly reduced through losses caused by fruit piercing moths.

The shortage of rain was reflected in a sub-normal citrus crop. The demand for fruit for local consumption and for budded trees continues to expand. The number of nurseries increases steadily, and we are aiming at the establishment and maintenance of nurseries by all Native Administrations in the Eastern and Western Provinces and in those of the Northern Provinces where propagation can be successfully carried out.

Recorded railments of Citrus fruits to the north during the twelve months ending 30th September, 1944, were:—

	Tons
Eastern Line	2,814
Western Line	209
	3,023

67. The manufacture of fruit drinks was continued by the Blaize Institute, Abeokuta, and the Farmers' Co-operative Society, Agege, but production was interfered with at times owing to difficulty in obtaining sugar and corks for sealing bottles. Output for the period October 1943 — September 1944 was:—

	Bottles
Abeokuta	156,552
Agege	3,743
	160,295

The Blaize Institute also produced 85,701 lbs. of jam and marmalade during the period.

Mangoes

68. There are four good mango varieties now under trial at Ibadan; the Julie, probably introduced a number of years ago from the West Indies, the Peter and Alphonse introduced from India in 1935 and the Borsha introduced from America by the American Baptist Mission, Ogbomosho. These are now being established also at out-stations.

The mango does not yield regularly each season. Budded plants of the introduced varieties have taken from four to seven years to come into bearing, and they have produced no crop for one or two years, after two or three seasons cropping. Average yields of fruits per tree so far have been Julie 158; Borsha 70; Peter 40, and Alphonse 37.

RICE

69. The main areas of production in Northern Nigeria are in the Sokoto and Niger Provinces. In the Bida area the season was not a good one, but a reasonable

crop was obtained. In Sokoto Province the crop suffered as a consequence of early recession of floods. Light rains and poor yields were reported from Bauchi. There was a certain amount of damage by grass-hoppers in Sokoto, and rats did the worst damage on record in that area. Improved strains of rice were distributed and sold to the farmers, namely, 15 tons of GC 79 in Kano; 50 tons GEB 24 and GC 79 in Bida and Abuja Divisions; 2 tons GC 79 in Minna area, and 2 tons GC 79 in Southern Zaria. Variety trials with new strains were continued at the rice testing stations at Bida and Kworre. The Badeggi rice mill was operated at a profit and during the year turned out 269 tons of clean rice for sale through the Chief Marketing Officer, Lagos. An improved system of mill accounts was introduced by the Accountant-General and adopted at Badeggi. The second mill has been set up at Baro for operation in 1945. Improvements to the buildings and mill at Badeggi were carried out during the year and the position is now very satisfactory.

70. Farmers in Southern Zaria are now growing pure GC 79 as a source of seed for other areas in Nigeria. Propaganda was carried out in Southern Zaria on the advantages of keeping the seed pure and of transplanting seedlings as compared with broadcasting the seed direct. Swamp rice is important economically in the Northern Provinces for it is an insurance against the failure of the Guinea corn or Millet crops. As an illustration of the expansion of rice cultivation, it is estimated that 800 tons of paddy were produced in Southern Zaria in 1944 as compared with only a very small amount before 1940. The Southern Zaria peasants know little about hulling paddy, so two Nupe women were brought there in 1944 to teach these producers how to improve the hulled sample by parboiling.

Distribution of Agbede Upland Rice seed continued in Owerri and Calabar Provinces but yields were poor, owing to dry weather in April. Satisfactory yields of swamp rice were attained but there were some failures due to excessive flooding or unsuitable soil. Work in Onitsha and Ogoja Provinces was mainly confined to seed distribution, 26 tons of G. 79 being issued. There was an increase in the acreage planted but unfavourable weather affected yields.

In Benue, riverside farmers are changing over from the indigenous varieties to G. 79. Upland rice is becoming more popular in the southern districts.

In Ilorin Province a detailed survey of the Pategi area was completed and other areas were resurveyed. Ilorin growers prefer G.E.B. 24 to G.C. 79, and planting of the former is widespread in Pategi emirate.

In Abeokuta Province, where a reduced acreage was planted, the crop suffered from drought at sowing time and never fully recovered. Requisitioning, which naturally was unpopular, secured 1,250 tons compared with 2,400 tons in 1943. Increasing numbers of farmers started both swamp and upland planting in the Colony, Ijebu, Oyo and Ondo Provinces. There is considerable export from Ondo Division to the big Oyo Province towns. Trial plots of swamp rice were started in Ondo and Ijebu Provinces with promising results.

The " Planter's rice mill " at Ekpoma was sold to an African and the No. 7 mill at Sapele was sold to the Estate which had rented it for the two previous seasons.

71. The estimated production of rice, by provinces, in 1944 is as follows:—

	Tons — Paddy
Sokoto	21,690
Niger	4,850
Bauchi	600
Bornu	200
Kano	3,000
Zaria	900
Southern Katsina	10
Adamawa	2,300
Owerri	40
Onitsha	2,500
Ogoja	300
Benin-Warri	12,000
Western Kabba	470
Eastern Kabba and Benue	1,000
Ondo	1,100
Oyo	100
Abeokuta	2,500
Colony	70
Ilorin	3,630
	57,260

The above quantity of paddy is equivalent to about 34,000 tons clean prepared rice.

COTTON

Details of yields, ginning percentages and prices have been given in my Half-Annual Cotton Reports. A summarized account for the year is given below.

Northern Provinces

72. The cotton crop in the Northern Nigeria cotton belt requires good steady rains from the end of June to the middle of October. In 1944 the rains were unevenly distributed and ended early, so that conditions were adverse for this crop. All cotton purchased for export to United Kingdom was graded by the Produce Inspection Branch of the Department. Cotton markets in areas suited to groundnuts, for example, Kano. Northern Katsina and Western Sokoto were again restricted to encourage the production of groundnuts. In the main cotton belt of Zaria, Southern Katsina and Eastern Sokoto there were no restrictions on cotton cultivation and the poor returns were due entirely to climatic conditions. The late rains meant late planting of the corn and groundnut crops and as these take precedence over cotton, this last crop was very late planted in 1944 and yields were correspondingly low. The ideal end of season weather for cotton is late cessation of rain and late onset of Harmattan, but in 1944 the finish of the rains and start of harmattan were both early — the worst combination possible for the cotton crop. 3,899 tons of cotton-seed were issued in 1944 and it is expected that 4,300 tons will be distributed in 1945 most of the increase being in the main cotton belt. Owing to the reduction in seed distribution to areas such as Kano, Northern

Katsina and Western Sokoto the amount of cotton grown and harvested was not nearly sufficient to meet the local demands for weaving and there was a very large movement of cotton from the main cotton belt to these areas; this contributed to the reduction in the amount of cotton available for export to United Kingdom. Prices as usual were higher in the internal trade than in the export market, for example, export market prices were 1s 7d delivered at ginneries but in internal trade markets the ruling prices were about 2½d to 3d lb, or even higher at times. This price difference between internal and export trade is always present; only cotton which is surplus to local weaving demands is sold for export, irrespective of the export price.

Cotton selection by the Botanical Section continued and there are some very promising strains in view. The present commercial cotton was all evolved from an imported strain, and the quality remains reasonably good and is in great demand in United Kingdom markets. Strain 26C one of the most promising new strains now being multiplied, has been carried to the Dandawa stage and should soon be available for distribution if it continues to maintain its present superior characteristics. Samples of the new strains were sent as usual to the Shirley Institute for analysis and checking.

Southern Provinces

73. In the south weather conditions deteriorated as the season progressed. Sixty-six tons of seed were sold for planting (in comparison there were 91 tons in 1943 and 80 tons in 1942). Planting took place under very favourable conditions, and the growing season was good, but the ultimate crop was reduced during the ripening period by excessive drought which entirely prevented the development of some bolls and reduced the size of others. From the general appearance of farms the crop could be described as fair, but just as in the north, the demand for cotton for local manufacture will undoubtedly have a marked effect on the quantity offered for sale for export in the twenty-eight gazetted markets in Ondo, Oyo and Abeokuta Provinces.

Botanical work has been continued. In the selection plot there were 32 progeny rows; 16 planted from self-pollinated and 16 from open-pollinated seed. In the previous season there had been no significant difference in yield between self and open pollinated strains. This season similarly, there has been no difference in lint characters.

There has been a steady improvement in lint characters over the last few years, as the following averages for all strains show:—

	1941-42	1944-45
Ginning, percentage	31.1	35.6
Halo Length	29.0 mm	30.5 mm

The high ginning percentage this season was not due to Pink Bollworm nor to light seed. Before ginning, damaged seeds and discoloured lint were removed. The average weight of 100 good seeds last season was 10 grammes against 10.5 grammes this season.

Improved Ishan Cotton bred every year by the Botanical Section is multiplied on Moor Plantation and subsequently re-multiplied twice by farmers in two confined areas at Meko, Abeokuta Province. Seed obtained from the Meko No. 2 area is subsequently used for general distribution to growers throughout Oyo, Abeokuta

and Ondo Provinces. There is considerable variation from year to year in the yield obtained at Meko, and also in the quantity of seed available year by year from Moor Plantation. Steps have been taken to ensure the supply of seed requirements for distribution at all stages, so that shortages which have sometimes occurred in the past at various stages in the multiplication scheme, should not recur.

74. *Pink Bollworm.*—In July, two adults of the Pink Bollworm, *Platyedra gossypiella*, Saund., were bred from resting larvae in cotton-seed stored at Soba, near Zaria. This was the first record of the occurrence of this well-known pest in Nigeria. A survey of cotton (in field and store) in the Zaria and Sokoto Provinces in November gave negative results; but subsequently one larva, taken in the field near Zaria, was received. It seems probable that the Pink Bollworm has reached the American cotton belt very recently.

During December and January, evidence was obtained that *Platyedra* is widely distributed in the Oyo-Abeokuta cotton belt and it is certain that it must have been present for several years. It has been found infesting both Ishan and Meko cotton. To date no evidence has been found of the existence of a larval resting stage in this area.

It is proposed to enforce the uprooting and burning of the cotton plants (after the harvest has been completed) by a fixed date each year with the object of ensuring a close season of at least four months, during which little food is available for *Platyedra*.

GROUNDNUTS

75. It was an unfavourable season for groundnuts. The late onset of the rains delayed the planting of the corn crops which precedes that of groundnuts particularly in the more northern areas. Rosette disease was widespread in Adamawa and Niger Provinces but not to any large extent in the other main groundnut producing provinces. The usual survey of peasant farms was undertaken in Kano Province, and measurements of yields per acre were taken in the three belts of this Province. In the southern belt there was an increased yield per acre in 1944 over 1943; in the middle belt yields were the same and in the northern belt the yields were below those of 1943. The Department again distributed improved seed selected by the Botanical Section, for example, 1,506 bags of K38 strain were distributed in Kano Province. Slightly increased acreages of groundnuts were reported from many areas but unfavourable weather conditions have kept the sales for export to slightly more than that of last year. Storage tests in Benue have shown that contrary to local belief groundnuts in bags can be stored satisfactorily but further trials will be undertaken to confirm this.

76. An intensive campaign against the beetle, *Pachymerons longus* (which attacks nuts in storage in peasant granaries), was carried out with successful results judging by the fact that no infested nuts were offered for sale to canteens in 1944-45 season. Research in Muri Division a few years ago evolved a satisfactory treatment for this pest and as the beetle had spread to many districts of Adamawa Province in 1943, control measures were extended to these areas. Futher research was carried out on the control of *Aphanus sordidus* — a beetle pest damaging stored groundnuts awaiting shipment.

77. Various experiments were undertaken at different farm centres to test the effect of applying superphosphate, and with spacing and cultivation experiments

and variety trials. The Botanist continued with his selection work. In Katsina Province yields were estimated at 10 per cent over 1943 and reports showed a poor crop over the French border. All groundnuts purchased for export continued to be inspected by the Produce Inspection branch of the Department. As usual, a large part of the crop was treated by the peasants to obtain oil for cooking, eating and lighting.

BENNISEED

78. The benniseed crop has again been disappointing; the wet season crop suffered from the lack of early rain, and the dry season crop from early cessation of the rains. Various causes have contributed to lessen the incentive of the Tiv farmers to plant benniseed, and some in the chillie growing areas expressed their intention of giving up benniseed altogether in favour of chillies. To prevent this happening steps were taken to ensure that no chillie seed was handed out until the farmers concerned had already planted their normal acreage of benniseed.

The price stood at £7 per ton throughout the year. The following figures for monthly purchases include those for all stations in Benue and Eastern Kabba.

1943	*Tons*	*1944*	*Tons*
November	136	July	728
December	275	August	3,578
1944		September	2,800
January	538	October	594
February	289	November	180
March	62	December	258
April	27	*1945*	
May	18	January	334
June	6		

	Tons
Total for Calendar Year 1944 =	9,074
.. .. 1943 =	8,215
,, ,, ,, ,, 1942 =	7,494

POTATOES

79. The demand for Nigerian produced potatoes continued strong, and production has kept pace. The following figures show the progress made on the production side since the beginning of the war:—

Province	*Railings*				
	1940	1941	1942	1943	1944
	Tons	*Tons*	*Tons*	*Tons*	*Tons*
Plateau	283	481	753	1,055	954
Zaria	37	91	162	346	534
Katsina	—	—	—	1	9
Total	320	572	915	1,402	1,497

In addition large quantities were consumed in the producing Provinces themselves, this amount being estimated at 200 tons. Other Provinces, although not exporting, produced a certain quantity for their internal needs, for example, in Adamawa

Province the farmers in Mubi and the Verre Hills met the needs of the Province. There was still a fair amount of old degenerated seed in Plateau Province, and to replace this by good quality seed imports were continued to the extent of 30 tons of " Up-to-date " in 1944. In Zaria Province the quality of potatoes is such that the importation of fresh seed is not justified until after the war. Propaganda on storage was continued by the Department, and farmers and middlemen are acting on the advice as can be seen from much more uniform marketing of the crop. Instead of several months of shortage in the year, the only periods of scarcity now are April and May, when the dry season crop is exhausted and the wet season crop has not begun. It is hoped that in time this gap also will be closed. Experiments on storing have been carried out on the farm centres in Zaria and Plateau Provinces. In Zaria Province, 20 tons were bought by the Department and stored at Giuga, the price paid being 0.7d per lb. at the height of the glut in September. By January losses had amounted to nearly 50 per cent, but on the other hand part of the crop was marketed at as high as 4½d a lb. showing that there are good prospects that the storing of potatoes from the time of plenty until the time of scarcity, will be a paying proposition. At an average price of 3d per lb., the average crop at present is worth £42,000 per annum to the growers. Observation on imported varieties with special reference to disease is being undertaken by Specialists of the Department. The most serious disease is a wilt which reduces yields. Distribution of good seed to new areas continues, especially in those suited to dry season production.

80. At Bamenda trials were conducted with both early and late planted crops using two local varieties (Twenty Eye and Smooth Skin) and two introduced varieties (Great Scot and Up-to-date). Both crops were very severely attacked by cut-worm, with the result that as a variety trial the experiment was a failure and yields were very poor. The annual export of potatoes from Bamenda Division has been roughly estimated at 140 tons. We still have to find a type of potato superior in quality to the local variety which can grow and yield successfully and withstand disease in this area. All varieties so far introduced and one of the two local varieties tend to become affected by the disease known as Black Heart which aptly describes the symptoms. So far the causal agent of this disease has not been found.

GUINEA CORN

81. Owing to poor rainfall in most districts a heavy crop could not be expected and in certain areas, for example, Southern Zaria Districts, parts of Kano and Daura and Katagum very poor yields were obtained. Imported strains continued to be tested at the farm centres and trials of local varieties were made. Propaganda on storage of grain as a means of avoiding famine was continued in Southern Zaria. A start was made with the building of permanent grain stores at Kano, and sites are being selected for stores at Zaria, Gusau and Katsina to provide a reserve against urban food shortage.

CHILLIES

Nigerian Birdseye Chillies

82. Seeds from ten selected plants in the 1943 selection plot were used to plant a selection plot of 1,000 plants. This season, owing to the increased demand for seed, 100 plants were selected for the 1945 selection plot, the remaining seed being held for multiplication.

A total of 4.8 acres was planted for seed multiplication this season. Fresh fruits harvested amounted to 6,875 lbs.; these dried to 2,529 lbs. (37 per cent). and gave over 1,200 lbs. of seed for distribution. The average yield was 527 lbs. dried fruits per acre.

Chillies have been grown for three successive years in one plot, and the yields of dried fruits per acre have been:—

	lbs.
1942	492
1943	886
1944	540

This suggests that the crop does not markedly exhaust the soil.

Breeding work with Nigerian Birdseye, Funtua and Akure as well as other strains has been continued in an effort to increase pungency.

In an endeavour to maintain the highest possible standard, seed multiplication and supply is kept in the hands of the Department. Seed distribution in 1944 was again confined to the Oyo and Ogbomosho areas of Oyo Province and to the Tiv division of Benue Province, but within these areas there was considerable expansion and the seasons results were again most encouraging. The crop was grown and marketed under the close supervision of the Agricultural staff and was subject to inspection by Produce Examiners.

The sole purchasers were Messrs John Holt and Company and the following quantities were marketed for export:—

	Tons
Tiv Division	36
Oyo — Ogbomosho	86
	122

SOYA BEANS

83. Trials of Soya Beans have again been made by the Botanical Section. Many strains were grown at Samaru including a number of new importations. Yields up to 800 lbs. were obtained. Single plant selections for planting in 1945 were made from a Trinidad variety.

Soya crops grown for seed multiplication on several Government farms gave satisfactory yields, but results were disappointing among farmers to whom seed had been supplied, and who were growing the crop for the first time.

GINGER

84. The growing season in 1944 was not a favourable one for this crop. Forty tons of cured ginger was purchased for export as compared with about thirty tons in 1943 and 50 tons in 1942. There is a large internal trade in ginger, as can be appreciated from the fact that 150 tons of uncured ginger was railed from the Southern Zaria during the year and an additional large quantity was carried out by traders.

CINCHONA AT ESOSONG, BRITISH CAMEROONS

85. In view of unfavourable reports from East Africa received in 1943, the quick Russian method of producing Cinchona has not been tried but 313,000 *C. succirubra* and 63,000 hybrid trees have been planted at Esosong at a rather close spacing (80 × 80 cms.) which will give a crop of prunings and thinnings at an earlier date than is normal. It was mentiond in the Annual Report for 1943 that a mixed sample of bark from the *Cinchona ledgeriana* trees at Bamenda, grown from Java seed introduced in 1927, was found by Monsieur La Garde, Director of the Quinine Experimental Station in French Cameroons to give a quinine sulphate figure of 10.2 per cent. Individual samples from these trees and from two hybrids growing in the same plot have been analysed at Ibadan; the results are summarized below, as expressed in the conventional manner.

	Total Alkaloids (free bases)	*Crystalline Quinine Sulphate* $(B_2H_2SO_4{}^7H_2O)$	*Other Alkaloids (free bases)*
	As percentages of bark containing 10 per cent moisture		
Average of six richest trees	9.5	10.6	1.6
Average of eleven intermediate trees	8.4	9.0	1.7
Average of ten poorest Ledgeriana trees ..	7.4	7.5	1.8
Average of two Hybrids ..	6.4	3.8	3.5

Because of variable growth conditions the bark analyses do not entirely reflect the genetic potentialities of the individual trees but by taking the six richest trees as a bulk selection we shall undoubtedly have a valuable strain.

DATES

86. Experimental work which was started in Bornu Province in 1941 has been continued. Trials have shown that the transplanting of seedlings is an unsatisfactory method of establishing a plantation of date palms. Ten per cent of the plants survived in a test made at Fika. Satisfactory results have been obtained from seed planted at stake although the site of the original plot at Maiduguri appears to be unsuitable and the palms have made very little growth. Good results have been obtained at other centres, especially Buni and Gumsuri.

As a result of improved cultural and manurial treatment, the plot planted at Fika in 1941 produced vegetative suckers from 17 per cent of the live stands, the number varying between one and ten suckers per palm. This is interesting as the production of suckers is rare among the parent palms at Fika; their presence in the trial plot should help us considerably in the propagation of any selection which may later be made from this collection.

VEGETABLES

87. Production of European vegetables continued to expand in 1944 and it is now possible for most accessible areas to obtain fresh vegetables. The Department continued to import seed for distribution and also distributed locally grown seed. It was found possible to produce seed from peas, radish, tomatoes, lettuce, carrots and cauliflower at Riyom in Plateau Province, but not at a cost competitive with that of imported seed. As imported supplies are now more certain seed research at Riyom is being discontinued except for the production of some seed for sale to Ibadan. The extent of the vegetable trade in Kano may be judged from the fact

that £431 was spent there by producers on imported vegetable seed. At Sokoto small quantities of vegetables for local consumption were produced at Kwarre and Sokoto itself. It was found that a walled garden was very useful in giving protection against insects and wind. At Maiduguri the Vegetable Growers' Association continued to function well and produced 70 tons of European vegetables and 20 tons of African vegetables during the year. There are 120 market gardeners operating successfully at Maiduguri and 13 at Biu. The Department at Bauchi issued seed to Toro growers, who marketed their products at Jos.

At the Agege vegetable garden ten acres were under production from April to June. It was then closed owing to the cessation of military requirements. In October six acres were put under cultivation again. Total production during the year 1944 was nine and a quarter tons.

SUGAR

88. Good progress continued to be made with the extension of the village sugar-crushing units and demand for this brown sugar remained very high. Unfortunately no new crushers were received from India for the 1944-45 season although an order had been put through in May 1944. Several potential sugar operators paid a deposit of £5 to the Native Administration against the cost of new crushers. In Adamawa the Native Administration operated a crusher in 1943-44 season to ascertain the economics of the business and they made a net profit of £15 15s after allowing 20 per cent depreciation. Hired labour was employed so it is obvious that substantial profits can be obtained under private enterprise and it is not surprising that the demand for these crushers is heavy. The product fetches a higher price (cp. 6d per lb. in Kano market) than imported sugar for demand usually exceeds the estimated supply of 2,000 tons per annum. In spite of this, 200 tons were purchased for Military units at 3d per lb. In Sokoto cane plantings were heavy and the crop excellent but prices remain very high. Crusher owners everywhere are repaying their loans satisfactorily. A small sugar centrifuge operated for five weeks at Gimi near Zaria in order to turn out a special order from the Railway of one ton of molasses. The bi-product of this process is crystalline sugar but there appears to be little future for these centrifuges as local production of relatively small quantities could not compete with the imported article in normal times. There are, however, good prospects for the Kumar sugar crusher or mill producing brown sugar and about 160 of these are operating efficiently at present. Post war prospects are considered very good, as there is a strong demand from Africans for this product which is mainly consumed as a sweetmeat.

ROPE AND TWINE

89. Although the Northern Nigerian twine has been found unsuitable for the export trade it still meets a large internal demand and the Department continued to organise production in 1944. The value of rope and twine purchased through the firms at Bida in 1944 amounted to £4,766. Rope and twine were also produced in Bauchi, Yola and Gusau on a large scale. At Yola all local orders in the Province were met; 38,500 yards of baling rope were sold to a firm and 4,500 yards to the Public Works Department and other institutions. Production in the Gusau area continued and large quantities of twine and rope were marketed through the Chief Marketing Officer, Lagos.

PRODUCE INSPECTION

90. The work of this section of the Department proceeded smoothly throughout the year and additional work due to the war was carried on as in 1943. Some difficulties involving adjustments were experienced over rubber grading but towards the end of the year the staff became better acquainted with the various grades of rubber handled. Voluntary grading of capsicums was introduced during the year.

91. Cocoa control regulations worked smoothly as in the previous season, and the crop was handled expeditiously. The percentage of Grade I was 25.81 as compared with 17.58 in the previous season. The increase in the percentage of Grade I is due to the increased premium (£1 10s) which was paid during the season. The greatest improvement was in the older cocoa areas where the proper methods of preparation are well known to growers who had practised these methods in former years. The price of Grade II cocoa was increased to £21 10s. The general quality of Grade II decreased still further and it is apparent that farmers were making no effort to improve the fermentation of Grade II. The 1944 Light Crop was disappointing and it was reported that many farmers did not harvest the Light Crop owing to the low price offered. As a result there was a considerable amount of Black Pod Cocoa in the 1944-45 Main Crop but, owing to better conditions, and more complete harvesting due to the higher prices, the crop showed an increase of approximately 20 per cent over the previous season which had been the smallest crop for several years.

92. Palm oil was purchased by grades based on the free fatty acid content of the oil. Five grades with f.f.a. limits of 9 per cent, 18 per cent, 27 per cent, 36 per cent, and over 36 per cent were instituted and purchase figures gave the following results:—

Grade I 55 per cent, Grade II 19 per cent, Grade III 14 per cent, Grade IV 10 per cent and Grade V 2 per cent.

The fixed f.f.a. limits for grades and the premia offered had an undoubted effect on the quality offered for sale and Hard Palm Oil (Grade V) has practically been eliminated. Production was slightly above average.

93. The groundnut season opened on 3rd November, 1944 and closed on 29th March, 1945. Buying and inspection arrangements were the same as in 1943 though the price was increased. The quality of the crop was good and there were no cases of deliberate adulteration. Impurities content averaged .266 per cent which is slightly less than in 1943. Production was approximately 16 per cent higher than in 1943.

94. The cotton crop in the Northern Provinces amounted to 12,309 bales of 400 lbs. lint, as compared with 17,265 bales in 1943. The season was not a good one due to bad weather, increase in local weaving, and also to the restrictions placed on cotton growing in Northern Sokoto and Northern Katsina Provinces. Large quantities of cotton were used to make native cloth, imported cloth being restricted in quantity, highly priced, and of inferior quality.

The price of seed cotton in local markets varied from 2¾d in Gusau district to 4d in Kano. Cotton was also transported north into French Territory, but the main trade is within Nigeria.

As compared with 1943 there was an increase in price of 2 10ths d. at Ginnery, making the price 1 7 10ths d. lb. Zaria, Funtua and Gusau ginneries, and 1 6/10ths d. lb. at Mallam Fashi and Mai Inchi ginneries. Reports from ginneries state that the ginning percentages of lint to seed were slightly lower than average in the 1944-45 season. The following table shows the relevant details:—

Ginnery	Ginning Percentage 1944	Average Ginning Percentage 1938-44
Zaria	32.53	32.75
Funtua	31.37	31.60
Mallam Fashi	30.68	31.10
Gusau	28.82	29.49
Mai Inchi	29.09	29.72
Kontagora	31.85	—

95. The following table shows the percentages of the different grades of Cotton in the Southern Provinces:—

Year	IN. 1	IN. 2	IN. 3	Total Ishan expressed as a percentage of the whole	NN. 1	NN. 2	NN. 3	Total native expressed as a percentage of the whole
1940	4.92	18.57	77.14	84.94		21.52	78.48	15.06
1941	4.32	46.06	49.62	95.16	17	64.18	35.65	4.84
1942	2.10	69.79	28.11	86.73		98.86	1.14	13.27
1943	10.07	81.49	8.44	56.01	34	92.90	6.76	43.99
1944	3.84	47.66	48.50	60.22		1.40	98.60	39.78

The prices paid at the ginneries in comparison with the 1943 season were:—

Grade	1943 Per cwt. s d	1944 Per cwt. s d
IN. 1	14 0	17 6
IN. 2	12 10	15 2
IN. 3	11 8	12 10
NN. 2	10 6	10 6
NN. 3	10 6	10 6

96. The production of potatoes increased again in 1944-45 as the following table shows:—

Year	Tonnage graded
1942-43	958
1943-44	1,458
1944-45	1,623

Quality on the whole was good and there were few cases of evasion of the Potato (Marketing and Export) Regulations. The trade generally is in the hands of

middlemen. At the beginning of the year the price per pound to the producer was 6d, falling to 3d in July and 1 1 10th d. in October, rising again in January 1945 to 3d and 4d.

The increased tonnage made great demands on the basket making industry and the supplies of conical baskets made in Zaria Province had to be limited in order to preserve supplies of cane. Experiments with other types of basket were continued. Chat potatoes, graded and returned to the owners for consumption within producing areas, fell from 61 tons in 1943 to 12 tons in 1944, showing that buyers partially grade potatoes before bringing them to the markets. Consumption of chats as food is increasing yearly, especially on the Plateau.

97. The inspection of rubber and the further training of the staff continued throughout the year. The following figures indicate the quality of rubber graded:—

PLANTATION RUBBER

Year	*A. I Sheet*	*A. II Sheet*	*A. II Sheet*	*C. I Scrap*	*C. II Scrap*	*B. I Crepe*	*B. II Crepe*	*Total*
								Per cent
1943-44	55.63	19.06	2.53	2.66	18.83	.51	.78	100
1944-45	33.80	38.01	2.03	1.56	24.60	—	—	—

* Crepeing Plants worn out.

WILD RUBBER

Year	*A. I Sheet*	*A. II Sheet*	*A. I Rope*	*A. II Rope*	*C. I Scrap*	*C. II Scrap*	*C. III Scrap*	*D. I Ficus*	*D. II Ficus*	*Niger Gutta*	*Total*
											Per cent
1943-44	17.12	7.43	.11	.27	50.74	11.88	7.46	.82	.10	4.07	100
1944-45	15.59	5.88	.37	.18	55.78	8.08	5.68	.18	.18	8.08	—

BAMENDA FARM

98. Work on the building up of the dairy herd at Bamenda continued during the year. Tick infestation was heavy during April and constant hand picking was necessary. A careful study was continued of the carrying capacity of grassland under controlled grazing and under free range conditions, and a large number of observation plots have been planted with local grasses and clovers known to be palatable to stock. Pig keeping is being developed, cross-bred sows being bred to a Large White boar. The local people are interested in pig keeping and there is room for development. Special attention has been given to soil conservation and protection from erosion. Cultural and variety experiments have been carried out with potatoes, wheat, soya beans, maize, linseed, pyrethrum, upland rice, yams, sweet potato and local types of beans. Work on cinchona included propagation by seed, woody and leaf cuttings and by grafting. Approximately 30,000 cinchona seedlings were planted out on sixteen acres in the field.

MARKETING

99. During the year the Ibadan showroom, which was closed for a period for lack of supervisory staff, was re-opened, but by the end of the year it became necessary to close it once more for the same reason.

There was a decided falling off in the number of enquiries and orders received from His Majesty's Forces; this is reflected in the receipts of the Lagos Depot which dropped sharply from £26,443 in 1943-44 to £11,102 in 1944-45. The former figure also includes payments for large military orders completed in 1942 and earlier.

The comparative figures for the Lagos showroom, which are included in those quoted above, show a slight decline at £5,387 in 1943-44 and £5,037 in 1944-45. This is due principally to the showroom being closed for longer periods for stock-taking with a consequent loss of sales days and, to a lesser extent, to the lack of an even flow of supplies.

The activities of the Port Harcourt showroom were increased during the year; payments to the Treasury during 1944-45 were £1,627 against £606 in 1943-44. Approximately half of the former figure represents sales from the marketing of potatoes ex-Bamenda. In season, supplies of foodstuffs such as vegetables, eggs, fruit, starch and rice were distributed to canteens, schools, hospitals and ships.

Control of "Kashin Yaro" (*Acanthospermum hispidum*).

100. In view of the widespread and increasing damage caused by the weed *Acanthospermum hispidum* (Hausa "Kashin Yawo") steps are being taken to enforce its control under the Agricultural Pests Ordinance. Meanwhile rules have been made locally by Native Administrations.

Preliminary experiments have been made in the Kano area for the destruction of the weed by spraying. Of the sprays used sulphuric acid has given the best results: copper sulphate was slightly less effective and is more costly. A 5 per cent solution has been found satisfactory and the rate of application 200 gallons per acre. This is effective in killing young plants but not the dormant seeds; a second application is therefore necessary and in some cases possibly a third, in order to ensure complete extermination.

A. G. Beattie,
Director.

Agricultural Department,
Ibadan, Nigeria,
14th March, 1946.